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In this issue



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Continued ►



frontispiece

New York City's day care centers for preschool children are supported with health services organized by city agencies. (See article on pp. 567-572.)

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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PUBLIC HEALTH SERVICE

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A Health Program for Children in Day Care Services

HUGH CHAPLIN, M.D., and HAROLD JACOBZINER, M.D.

THE NEW YORK CITY Department of Health for the past 7 years has arranged to look after the health of children of low-income families at centers established to provide day care for small children. Introduced only at each center's request, a comprehensive program of health examinations, immunization, and health counseling is now offered at 70 of 76 centers in the city.

These centers are supported by the New York City Department of Welfare, which shared in a series of planning sessions with the health department. Health and welfare officials continue to consult periodically in appraising changing needs and achievements in the centers.

Each center cares for from 40 to 75 children aged 3 to 6 years. About half have only one parent. The children may arrive at the center between 8 and 8:30 a.m. and remain until 5:30 to 6 p.m., 5 days a week, 12 months a year.

The time is fortunately long past when the centers provided mere custodial care by untrained staffs. For the past 15 years all day care services in New York City for children under 6 years of age have been subject to the standards of the New York City Sanitary Code, Section 198. These standards deal with fire and building safety, adequate space per child, the number and qualifications of teachers, types of

educational and play materials and equipment, and the program of indoor and outdoor activity, as well as health requirements. The division of day care and foster homes in the New York City Health Department is responsible for seeing that the centers qualify for a license.

The great majority of the centers are located in excellent quarters in new housing projects. The space is arranged especially for the particular needs of a child care center, and furnishings and equipment are carefully planned for small children. All provide classroom space indoors and play yards outdoors. Teachers must be qualified as educators for preschool children. The director of a center often holds a master's degree in education.

The objective is to provide wholesome, constructive, and enjoyable activities for children, under skilled and understanding guidance with a minimum of regimentation. The centers aim to develop independence in the child and to teach him how to live happily with other children and adults. There is enough supervision to preserve the value of necessary control and encourage self-discipline. Visitors to the centers have said that their principal impression is that the children are relaxed and happy.

The sanitary code requires that each child have a physical examination prior to admission and every 6 months thereafter while attending the center. Records of the examinations must be kept in the centers. Vaccination against smallpox and DTP immunization are also necessary before admission, and daily inspection of the children is required to help ex-

Dr. Chaplin is pediatric consultant in the division of day care and foster homes, and Dr. Jacobziner is assistant commissioner, New York City Department of Health.

clude contagion and detect other illnesses. Each staff member who comes in contact with the children must have at the time of employment and every 2 years thereafter a physical examination, including a chest X-ray and any other indicated laboratory tests.

The licensing requirements have undoubtedly raised the standard of day care in this city. However, the requirements are minimal rather than ideal, and they are often barely satisfied. For example, in the past physicians often submitted reports of physical examinations with little significant information. This deficiency could have been due to lack of real parental interest in a thorough examination. Or it is possible that the physician did not realize the importance of his findings to the center's staff.

In an effort to raise health conditions to the optimum, officials of the health and welfare departments began to talk about health services for the city's day care centers in 1947. The first comprehensive health program was tried in 1952.

Principles and Components

A basic principle of the health program is that it is to supplement, not replace, the services of the family physician. The program includes health examinations for the children, immunizations whenever due, and conferences with the parents. The preadmission and the 6 months' examinations, as well as special examinations requested at any time by the center's director, all may be done at the center. However, parents are urged to obtain as many services from their family physician as they wish, and the center's health services are then adjusted to the needs of the individual child.

Another principle is that a parent must always be present when a child is examined. If necessary, parents take time off from work for this purpose. Presence of a parent is required so that a pertinent history can be obtained and the recommendations of the physician and nurse imparted directly. Maintenance of the child's health and development of his total personality are not isolated incidents but are significantly dependent on the health of the family and of the community. Therefore, the health services must be family centered and family oriented. It

is unwise and impractical to view the child as separate from his family and from the community of which he is a part.

The Health Team

Health services at each center are provided by the director, a counselor from the welfare department to take family histories, a physician, and a nurse. The physician is usually assigned to a center for two or three 3-hour sessions each month. The nurse is present at each of these sessions for conferences with the parents. At an extra session, she prepares for the next examining period, determining which children are due for an examination or an immunization injection, checking the health records, and investigating the general health status of the children. She also determines how well the parent has carried out the recommendations of the physician.

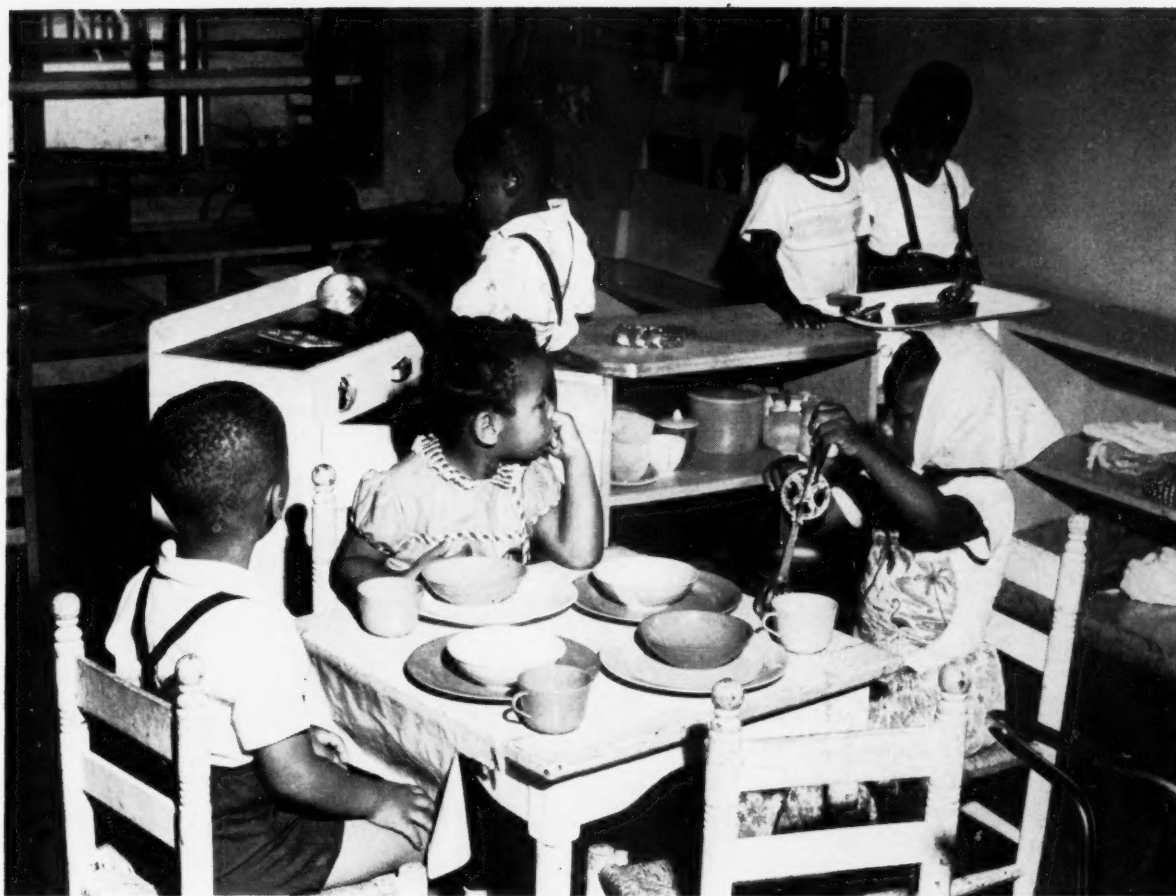
Practicing physicians are selected for the program and supervised by a pediatric consultant to the department of health. They are chosen not only because they can be counted on to do thorough health examinations but quite as much because of their sympathetic understanding of the child in his relations with family and associates and their knowledge of growth and development in the child. Participating are approximately 40 physicians, the majority women, some serving as many as 4 centers and others only 1. Six are certified by the American Board of Pediatrics. All have had some formal training in pediatrics.

Nursing service is provided either by the department of health or by one of the approved visiting nurse services.

Health Examination

The health examination is conducted in a leisurely manner and with care. All clothing except the underpants is removed. The children are examined sitting, standing, and lying down. They are referred to appropriate agencies promptly for the treatment of any adverse conditions found.

A special set of eye examinations is used to help the physician rule out anatomical eye defects. Children are screened for visual defects by the educational staff who are instructed in techniques by health department consultants.



... wholesome, constructive, and enjoyable activities ...

If the reports of the physician's examination or of the screening test suggest any abnormality, the physician refers the child to an eye specialist for a complete examination.

Routine health problems of the children are of course handled directly by the center physician. But more serious or complicated problems are first discussed at a case-study conference of the whole health team after each member has examined or interviewed the child with the problem in mind.

Health Counseling

If the health examination and immunizations were all that were included, it is possible that other types of services would prove quite as satisfactory. The program includes, however, a feature that makes it particularly valuable and perhaps unique. This is health counseling. The physician listens to the parent, who must be present at the examination, even as he would

in his office. The nurse not only explains to the parent how to follow the physician's recommendations but also has ample opportunity to discuss many other matters on which the parent may need guidance and reassurance. At the director's request, both physician and nurse once or twice a year attend the monthly parents' meetings, at which they discuss general health questions informally.

Counseling is extended to the teachers, both through personal conferences about special children and at teachers' staff meetings. Individual situations, however, are not discussed at staff meetings.

The nurse also meets at least once a year with the teacher of each child. Affording an opportunity for an exchange of information between nurse and teacher, this conference is intended to insure that children with health problems are referred to appropriate services and that referrals are followed up.

Ancillary Activities

In addition to the regular program, the center health team cooperates in the effort of the health department to promote safety and prevent accidents among children. Physicians and directors report on a designated form to the health department all serious accidents occurring to the children under supervision. Also each director, physician, and nurse has been provided with what might be called a "safety library," which consists of five or more reprints describing how accidents occur and what to do to prevent them. The material is intended for use in counseling with parents or teachers.

Still another part of the center health program is the preparation of the school health form, which is completed to be forwarded to the grade school where the child will be enrolled. The physician fills out the form at the final periodic health examination. Providing this information for the public schools saves considerable time and effort on the part of the physicians of the bureau of school health, as the record stays with the child through his school career.

Orientation and Installation

Early in the development of the health program, we recognized the need for careful advance planning and preparation for installation in a particular center. The center staff, as well as others who are to complete the health team, must be thoroughly oriented as to the aims of the program and their individual duties. To accomplish this important task, the following procedures were worked out:

Action is initiated by the lay board of a child care center through a request to the health department for information. A meeting is then held at the center. Present are members of the lay board, the director of the center, the educational consultant from the department of welfare, a supervisor from the nursing organization that is to provide the public health nurse, and the pediatric and nursing consultants from the division of day care and foster homes. The health department consultants describe the program in detail, and thorough discussion is encouraged.

After this meeting, if the lay board wishes to adopt the program, it must request it in writing from the department of health.

On receipt of the request, the health department arranges a second meeting at the center which actually launches the program. In addition to those at the first meeting, the new center physician and nurse, the department of welfare counselor, and the local district health officer of the health department are present. Every detail of the program is discussed so that each member of the health team will have the opportunity to clarify in his mind his own duties and his relation to other team members.

About 6 months after the program is started, the pediatric and nursing consultants together visit an examination session to evaluate it and to discuss any matters not clearly understood by any member of the center's health team. Even though supervision is continuous, a flexible policy is favored and changes in the program to meet local needs are encouraged, so long as they are consistent with the basic philosophy.

A day care center must meet certain physical requirements before it can participate in the health program. There must be adequate space so that the physician can satisfactorily conduct his examination. The room need not be large, but it must be well lighted and heated during the winter and have proper ventilation. There must be running water nearby and an electrical outlet into which a small stove for sterilizing syringes and needles can be plugged. There must be another room nearby for the nurse-parent conferences.

Another requirement is that the director provide an assistant for the examination sessions, preferably a teacher. The nurse will be counseling with parents and cannot assume responsibility for the administrative phase of the examining session.

Less Than Perfection

It would of course be unrealistic to expect that the health program would operate perfectly in every detail. On the contrary, flaws were expected, and they have indeed appeared.

Perhaps our greatest difficulty is to assure satisfactory teamwork. We are attempting to



. . . nurse-parent conference . . .

obtain efficient administration of a complicated program that depends for its success on the willing and enthusiastic cooperation of four or five different agencies and different professions and disciplines. The center's board members, the director, the teachers, the welfare department counselor, the physician, and the nurse, as well as the educational consultant of the department of welfare who provides overall supervision for the day care centers, all of these contribute to agreement about the purposes and details of the program for the benefit of the child. The director of the center is the key person in the success of the enterprise. Unless the director is keenly interested, we feel the program should not be started in that center.

Cooperation has been achieved consistently, we believe, because of a number of factors. For one, all concerned feel they have shared in its development, and those who have worked with it are thoroughly sold by the experience. Each center has requested it, and the center physician has expressed a definite desire to join the team. Finally, success in many centers has given impetus to others.

Another difficulty is obtaining and keeping qualified physicians and nurses. Physicians need not be pediatric board members, but they must have had experience with children. They must like children and be interested in the whole child, his psychological as well as his physical development, and his family. They must also be interested in the basic type of public health



. . . thorough health examination . . .

education represented by the counseling of parents and teachers.

Because of time limitations, providing adequate supervision for the physicians, nurses, and directors has been still another troublesome area. The consulting pediatrician and nurse in the health department plan to visit together an examining session in every center each 6 months.

At least once a year the pediatric and nursing consultants meet with all the center directors, in groups, to try to help them with problems. Twice a year the health department consultants meet with all the physicians in the program for the same purpose. At these latter meetings also some particular phase of the health program is discussed by a specialist, as a means of constantly improving and expanding the program.

Case Histories

To illustrate the value of the health program, two case reports are cited.

L.C., a 5-year-old girl, was generally well but she often needed cathartics because of persistent constipation. She had intermittent enuresis, and there was a unilateral strabismus. Though a reasonably contented child she was high strung and did not always enjoy good relations with the other children in her class. Her mother was so unstable emotionally that she finally was placed in an institution. For this reason a detailed medical history was difficult to obtain.

The child was given glasses for her strabismus

and received some help regarding her constipation and enuresis. The first few health examinations failed to show any other physical abnormalities. Then quite unexpectedly the physician found an elongated mass in the abdomen extending into the pelvis. The child was admitted at once to a hospital where the diagnosis of megacolon was made. A two-stage abdominoperineal rectosigmoid pull-through operation was successfully performed.

The constipation was cured; the enuresis disappeared; and what was particularly noticeable was the change in her disposition. She became happy, made friends easily, and no longer presented the psychological problem she had shown before.

Repeated thorough health examinations discovered a major abnormality which an unsatisfactory history had helped obscure. Prompt referral and skillful surgery quite changed this child's life.

S.B., born January 19, 1951, was admitted to a child care center on June 20, 1955. His mother had not been able to manage him. He had run away from home a number of times. He was restless and destructive. At the child care center, he took no interest in the class activities, destroyed equipment, knocked down houses other children had built, and even molested the children. He never ran away from the center, however, and seemed fond of his teachers. His mother was so disgusted with him that she sent him to the center each morning in an unkempt condition, and efforts to get her to do a better cleanup job were only partly successful. Then the center physician spoke to the child about cleanliness. As a result the child made his mother wash him and give him clean clothes before he would go to the center.

The first few health examinations failed to show any special abnormalities. Vision screening tests proved impossible because the child would not cooperate. However, the physician felt further efforts should be made to test the

child's vision. He was examined at the Kings County Hospital eye clinic where he was found to be suffering from amblyopia.

Glasses were prescribed with the most remarkable results. He obviously saw clearly for the first time. He became interested in class games, used large and small playthings with great interest, participated well with the other children, and was happy and agreeable.

Though he had not given evidence either to his mother or the center staff of poor vision, he obviously saw very little. Being a high strung child, he took his frustrations out on his environment and his associates. A thorough health program discovered his difficulty.

Conclusion

Looking back on our experience, we believe the following factors have been significant. The program is thorough, yet practical. For the most part, the caliber of the center staffs, the consultants both from the department of welfare and from the department of health, and the physicians and nurses has been unusually high. And perhaps most important, every member of the health team has been carefully chosen and repeatedly briefed about the program before it has been started in any center. Provision has been made also to give the physicians preservice and inservice training.

As a result, nearly 5,000 children of low-income families have undoubtedly been given a better quality of health supervision than they would have received otherwise. We believe the parents have gained a better understanding of parent-child relationships and the kind of health care and supervision they should obtain in the future for their children.

We are greatly encouraged by the success of this program in New York City, and we hope that, with whatever modifications are necessary to meet local conditions, it will be given a trial in other cities.

Patterns of Hospital Prepayment Coverage in the United States, 1956

MAURICE E. ODOROFF, M.A., and LESLIE MORGAN ABBE, B.S.

A NATIONAL household survey of the use of general hospitals has afforded an unusual opportunity to obtain firsthand information on the extent of hospital prepayment coverage. The survey covered about 27,000 households, consisting of some 90,000 persons of all ages, drawn from the civilian noninstitutional population of each State then in the Union. It was conducted by the Bureau of the Census in September 1956, in connection with its Current Population Survey, for the Division of Hospital and Medical Facilities of the Public Health Service. It included three-fourths of the families in each of the 330 sample areas comprising the Current Population Survey base (1). Three earlier reports have described the survey procedures and presented provisional findings on various factors associated with the use of general hospitals (2-4).

As a supplement to the main objective of obtaining information on hospital use, three questions were asked in the survey interview about hospital insurance and membership in other plans providing protection against the costs of hospital care. These questions determined whether or not persons had such protection, the principal type of plan held, and the services covered by the plan. This information could be matched with other data collected on personal and family characteristics. To facilitate accuracy on the part of the respondents, each family was sent a letter ex-

plaining the nature and purpose of the survey and asking them to prepare in advance to supply information about hospitalization insurance or other prepayment coverage.

Instructions to the enumerators contained several definitions relating to prepayment coverage. The insurance or prepayment plans to be included were those of a general nature covering all or some part of hospital costs regardless of the reason for entering the hospital. They included the following:

1. Commercial hospital insurance (when not limited to accidents), on either an individual or group basis.

2. Blue Cross or Blue Shield plans, or other nonprofit plans sponsored by medical societies, on either an individual or group basis.

3. Consumer-sponsored plans (not types 1 and 2) which provide prepaid hospital care, including cooperatives and plans sponsored by fraternal organizations.

4. Industrial plans of an employer or union which provide hospital care beyond that legally required for industrial accidents.

5. Other free or reduced-cost hospital plans, such as hospital employee benefits, free hospital care for dependents of Armed Forces members, and the like.

The following policies and plans were excluded since they are for particular purposes or of uncertain availability: (a) policies covering only accidents, "dread diseases," income lost from disability, clinic or office visits, or liability for injury to others, and (b) free hospital care for veterans in Veterans Administration hospitals.

After establishing the existence of prepay-

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ment coverage in a household, the enumerator asked: "What kind of insurance or plan is it—Blue Cross or something else?" In designating the type of prepayment plan, the term "Blue Cross" is used to include the prepayment plans of more than 80 nonprofit corporate organizations for hospital care, together with related plans of a similar nature covering surgical care under the general term "Blue Shield." "Other plans" are all those not identified as Blue Cross or Blue Shield. For persons who had Blue Cross and another prepayment plan, the enumerators identified and reported only the most comprehensive one. Hence, no more than one plan is reported for each person in the study.

The enumerator next asked: "What kinds of services does the plan cover?" Since all persons previously identified as covered by a prepayment plan were understood to be eligible for hospital care, this question was intended to find out for what other services, if any, they were eligible. The categories of services were defined as follows:

Hospital care: The cost of room and board at the hospital, nursing care, and use of the laboratory, operating room, and similar facilities, whether or not the prepayment plan covers the full cost of all these services.

Surgery: All fees (or any part of the fees) charged by surgeons for performing operations.

Table 1. Hospital prepayment coverage status by race and sex, September 1956

Race and sex	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
All persons.....	63.6	49.2	8.4	6.0
Male.....	64.1	49.7	8.4	6.0
Female.....	63.2	48.8	8.4	6.0
White.....	67.0	52.1	8.4	6.4
Male.....	67.4	52.6	8.4	6.3
Female.....	66.6	51.7	8.4	6.5
Nonwhite.....	35.7	25.2	7.8	2.7
Male.....	36.3	25.5	7.8	2.9
Female.....	35.2	24.9	7.8	2.6

¹ Other combinations of services or other single services.

Table 2. Hospital prepayment coverage status by age and sex, September 1956

Age group (years)	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
<i>All persons</i>				
All ages.....	63.6	49.2	8.4	6.0
Under 14.....	64.1	50.3	7.1	6.7
14-24.....	60.8	47.7	7.8	5.3
25-34.....	70.8	55.9	7.7	7.1
35-44.....	71.5	55.3	9.4	6.9
45-54.....	68.5	52.9	9.7	5.9
55-64.....	62.6	46.9	11.2	4.7
65 and over.....	36.5	25.1	8.5	2.9
<i>Male</i>				
All ages.....	64.1	49.7	8.4	6.0
Under 14.....	64.0	50.1	7.3	6.5
14-24.....	59.0	47.0	7.3	4.6
25-34.....	70.5	55.7	7.8	7.0
35-44.....	71.9	55.2	9.6	7.1
45-54.....	70.0	54.3	9.4	6.3
55-64.....	64.9	49.1	10.8	5.1
65 and over.....	39.2	27.2	8.9	3.2
<i>Female</i>				
All ages.....	63.2	48.8	8.4	6.0
Under 14.....	64.3	50.4	6.9	6.9
14-24.....	62.3	48.4	8.1	5.9
25-34.....	71.1	56.1	7.7	7.3
35-44.....	71.2	55.4	9.2	6.7
45-54.....	67.2	51.6	9.9	5.7
55-64.....	60.5	44.6	11.6	4.3
65 and over.....	34.2	23.4	8.2	2.6

¹ See table 1, footnote 1.

Other services: Includes general care by a doctor in a hospital, all hospital costs beyond a certain amount (major medical expense insurance), and similar services other than hospital care as described above. This category may include combinations of services in a hospital other than hospital care and surgery or other single services.

This report presents national data on the percentage of the civilian population with hospital prepayment coverage, in accordance with the definitions described above. The data on the extent of coverage are shown in the accompanying tables with respect to demographic, so-

cial, and economic characteristics of the people covered. Coverage is classified by race and sex, age and sex, veteran status, urban-rural type of residence, employment status, and income status for families and individuals. Highlights of the findings are discussed below.

Demographic Factors

Race and sex. Very little difference appears in the extent of prepayment protection for men and that for women, either in the total coverage or in the various forms (table 1). The nonwhite population, however, has much less coverage than the white population. Of the white population, 52.1 percent have hospital and surgical prepayment protection, but only 25.2 percent of the nonwhite population are covered. Coverage under all plans stands at 67.0 percent for the white population and at 35.7 percent for the nonwhite.

Age. The proportion of the population with hospital prepayment protection varies considerably with age (table 2). Coverage under all plans for children under 14 years old is reported as 64.1 percent. The rate rises to a maximum of about 71 percent for persons 25 to 44 years of age, then decreases moderately to age 64. For persons 65 and over, prepayment coverage under all plans combined falls to 36.5 percent, coverage for men of this age reaching 39.2 percent and for women dropping to 34.2 percent.

Table 3. Hospital prepayment coverage status for males 14 years and over by veteran status, September 1956

Veteran status	Percent of males 14 years and over with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
All males 14 years and over-----	64.1	49.5	8.9	5.7
Veterans-----	70.6	54.6	8.9	7.1
World War I-----	73.9	57.2	8.9	7.8
Other veterans-----	64.1	49.5	9.0	5.6
Nonveterans-----	60.3	46.5	8.8	5.0

¹ See table 1, footnote 1.

Table 4. Hospital prepayment coverage status by type of residence, September 1956

Type of residence	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ¹
Urban-----	68.2	51.9	9.8	6.5
Within urbanized areas, total ² ----	69.2	52.5	10.8	6.0
1 million or more-----	69.0	51.3	12.8	4.8
250,000-999,999-----	68.4	51.8	8.6	8.1
Under 250,000-----	70.7	56.2	8.3	6.3
Outside urbanized areas, total-----	65.7	50.6	7.3	7.8
25,000 or more-----	70.3	59.7	5.9	4.7
2,500-24,999-----	64.0	47.4	7.7	8.9
Rural nonfarm-----	64.4	51.1	6.9	6.5
Rural farm-----	40.3	32.7	4.7	2.9

¹ See table 1, footnote 1.

² Urbanized areas comprise a central city of 50,000 population with its urban fringe, defined as contiguous areas of a population density of 500 dwelling units per square mile, plus similar noncontiguous areas within 1½ miles highway distance. (Metropolitan areas include entire counties and are usually considerably larger than their urbanized areas.) U.S. Bureau of the Census: Census of Population: 1950, vol. 1, pp. xxvii and xxxv.

Veteran status. Only minor variation exists with respect to veteran status for total prepayment coverage (table 3). The rate for all veterans is 70.6 percent and for nonveterans, 60.3 percent. The younger veterans of World War II have a slightly higher percentage of coverage.

Social Factors

Type of residence. The rate of coverage for hospital prepayment protection is consistently high for persons in cities of 50,000 inhabitants or more (table 4). These cities and their built-up fringe areas, defined by the Bureau of the Census as "urbanized areas," have a coverage rate of 69.2 percent. The level of prepayment protection is slightly less for people residing in cities with populations between 2,500 and 25,000, where 64.0 percent are covered. Coverage is much less, 40.3 percent, for people who live on farms.

Employment status and industry. Very marked differentials appear in the proportion

of hospital prepayment protection according to employment status (table 5). Among wage and salary workers in agriculture the coverage rate is 26.5 percent, much less than one-half the rate of 68.1 percent for all persons in the labor force. At the other end of the scale, wage and salary workers in manufacturing have prepayment protection for 84.9 percent of their number. The lowest coverage among employed persons outside agriculture is in domestic service, with 44.6 percent covered. Among disabled persons, who cannot work, the coverage is about 21 percent.

Income and Family Status

Income is more closely associated with the extent of prepayment protection than any other factor investigated. For both primary families and primary individuals, prepayment pro-

tection rises rapidly as income increases (table 6). When family income is less than \$1,000, only 18.4 percent of primary family members have coverage of any kind. This figure may be compared with 65.2 percent for all primary families and a maximum of 83.6 percent for families with incomes between \$7,500 and \$10,000. A slightly lower proportion of families with incomes over \$10,000, 80.1 percent, have prepayment coverage. For all primary individuals (who live alone or else maintain a household with persons not related to them) the level of prepayment coverage is 47.5 percent, or less than three-fourths of the coverage for all members of primary families.

Income is also related to the type of protection plan carried. Prepayment coverage increases steadily with income, both under Blue Cross plans (including Blue Shield) and under

Table 5. Hospital prepayment coverage status of persons aged 14 years and over by employment status and industry, September 1956

Employment status and industry	Percent of population, aged 14 years and over, with hospital prepayment coverage					
	All types of coverage			Hospital and surgical	Hospital only	Other services ¹
	All persons	Male	Female			
Total, 14 years and over.....	63.4	64.1	62.8	48.8	8.9	5.7
In labor force.....	68.1	68.1	68.3	52.7	9.3	6.1
Employed.....	68.9	68.9	69.0	53.3	9.4	6.2
Agriculture.....	32.6	33.8	29.2	25.2	5.0	2.3
Wage and salary workers.....	26.5	27.7	23.2	19.4	4.4	2.7
Self-employed workers.....	36.7	36.6	-----	29.6	4.9	2.2
Unpaid family workers.....	31.5	33.0	30.8	23.5	6.0	2.0
Nonagricultural industries.....	73.5	73.9	72.8	56.9	10.0	6.6
Wage and salary workers.....	75.2	75.9	73.8	58.4	10.0	6.8
Mining ²	81.5	80.8	-----	58.9	4.3	18.3
Construction.....	59.0	58.4	-----	45.0	9.0	4.9
Manufacturing.....	84.9	85.7	82.5	67.4	10.5	7.0
Transportation.....	81.3	81.5	80.5	63.5	10.5	7.3
Trade.....	70.8	69.3	73.1	55.2	9.2	6.4
Services.....	67.7	67.8	67.7	51.3	10.2	6.2
Private households.....	44.6	47.1	44.2	34.0	7.2	3.4
Professional services.....	74.5	71.0	76.4	56.6	11.2	6.7
Other services.....	71.0	68.0	74.8	53.5	10.6	6.9
Public administration.....	75.1	72.6	81.8	56.6	10.7	7.8
Self-employed workers.....	60.4	59.9	62.3	44.4	9.9	6.1
Unpaid family workers.....	60.8	-----	62.5	51.5	5.9	3.3
Unemployed.....	41.8	35.8	50.2	31.2	6.1	4.5
Not in labor force.....	56.7	45.1	59.6	43.4	8.3	5.1
Keeping house.....	60.7	-----	60.6	46.3	8.6	5.7
Going to school.....	63.7	63.4	63.9	49.7	8.2	5.8
Unable to work.....	20.7	23.2	17.2	13.4	6.1	1.2
Other nonworkers.....	38.2	36.1	46.9	28.0	7.4	2.8

¹ See table 1, footnote 1.

² Includes forestry and fisheries.

Table 6. Hospital prepayment coverage status by family status and income, September 1956

Family status and income ¹	Percent of population with hospital prepayment coverage			
	All types of coverage	Hospital and surgical	Hospital only	Other services ²
<i>Members of primary families</i>				
All incomes	65.2	50.6	8.5	6.1
Under \$1000	18.4	12.7	4.2	1.6
\$1000-\$1999	31.6	23.1	5.8	2.7
\$2000-\$2999	47.3	36.3	6.8	4.1
\$3000-\$3999	65.2	51.1	8.9	5.3
\$4000-\$4999	74.8	59.1	8.4	7.3
\$5000-\$7499	81.3	63.8	9.6	7.9
\$7500-\$9999	83.6	65.3	9.1	9.2
\$10,000 and over	80.1	60.4	12.7	7.0
Income not reported	62.0	46.5	10.8	4.7
<i>Primary individuals</i>				
All incomes	47.5	34.3	8.6	4.5
Under \$1000	25.1	16.4	6.7	2.0
\$1000-\$1999	40.4	28.2	7.7	4.5
\$2000-\$2999	56.2	40.3	10.3	5.5
\$3000-\$3999	73.8	58.0	10.3	5.5
\$4000-\$4999	77.3	58.9	9.5	8.9
\$5000 and over	73.0	56.2	8.6	8.1
Income not reported	56.7	36.1	15.5	5.2

¹ Primary family members include persons related by blood, marriage, or adoption (one being the head of the household); primary individuals are heads of households not living with relatives. "Income" for members of primary families includes money income of all members of the family; for primary individuals, it includes personal income only.

² See table 1, footnote 1.

other sources of coverage (table 7). However, the proportion of all coverage carried by Blue Cross-Blue Shield is about 40 percent for persons with family incomes of less than \$1,000, and about 60 percent at incomes of \$10,000 or more.

Comparison With Other Studies

The data obtained from this study in 1956 provide a useful benchmark in the field of prepayment coverage, which is one of the most rapidly changing aspects of medical care today. One other study on a national scale was conducted in 1953 by Anderson and Feldman, for the Health Information Foundation (5). In addition, annual estimates on the number

of people protected for hospital, surgical, and regular medical expense have been compiled since 1940 by the Health Insurance Council, which now comprises eight insurance associations. These estimates afford a panorama not elsewhere available as to historical trends in the health insurance field (6).

A fairly close correlation appears between

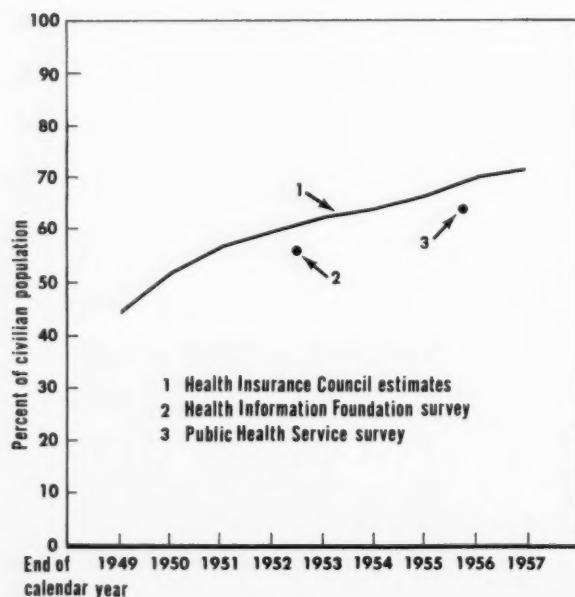
Table 7. Hospital prepayment coverage status by source of principal coverage, by family status and income for selected age groups, September 1956

Family status and income ¹	Percent of population with hospital prepayment coverage, by source of principal coverage		
	All sources	Blue Cross-Blue Shield	Other plans
<i>Members of primary families, 14 years and over</i>			
All incomes	65.3	32.9	32.4
Under \$1000	19.9	7.1	12.8
\$1000-\$1999	34.6	13.7	20.9
\$2000-\$2999	49.6	20.4	29.2
\$3000-\$3999	65.5	30.4	35.1
\$4000-\$4999	74.0	37.4	36.6
\$5000-\$7499	80.6	41.9	38.7
\$7500-\$9999	82.7	46.6	36.1
\$10,000 and over	79.4	48.8	30.6
Income not reported	62.5	34.9	27.6
<i>Members of primary families, under 14 years</i>			
All incomes	64.9	32.0	32.9
Under \$1000	14.8	5.7	9.1
\$1000-\$1999	24.3	10.8	13.5
\$2000-\$2999	42.2	16.2	26.0
\$3000-\$3999	64.6	30.9	33.7
\$4000-\$4999	76.4	38.2	38.2
\$5000-\$7499	82.9	40.9	42.0
\$7500-\$9999	86.2	47.6	38.6
\$10,000 and over	82.7	49.3	33.4
Income not reported	60.3	31.1	29.2
<i>Primary individuals</i>			
All incomes	47.5	23.4	24.1
Under \$1000	25.1	10.6	14.5
\$1000-\$1999	40.4	19.9	20.5
\$2000-\$2999	56.2	27.8	28.4
\$3000-\$3999	73.8	38.4	35.4
\$4000-\$4999	77.3	30.8	36.5
\$5000 and over	73.0	35.1	37.9
Income not reported	56.7	32.7	24.0

¹ See table 6, footnote 1.

the trend estimates and the data of the 1953 and 1956 surveys, as shown in the accompanying chart. In this chart all data are related to the total civilian population. Adjustments from a population base covering only the non-institutional population were considered advisable for the data of the two surveys in the comparison because of the difficulty in projecting annual change in institutional population for trend purposes. On this basis, the 1953 survey shows a level of prepayment coverage 6.4 percent below the interpolated percentage estimate of the Health Insurance Council. The 1956 survey shows a level 7.8 percent below the interpolated estimate of the Health Insurance Council. The close agreement of these differentials in the 1953 study and in the present report, when a substantially larger sample base was used (about 90,000 persons, as compared with 8,846 persons), suggests the possibility of overstatement in the annual trend series. One recognized difficulty in the Health Insurance Council estimates is an exact adjustment for duplicate coverage. This was noted in the report of the 1953 survey (5). Other possible sources of differences noted therein include some lag in processing lapsed policies and the likelihood of some under-reporting of coverage by survey response, such as the failure to men-

Hospital prepayment coverage, United States, 1949-57



tion disability policies which carry minor payments for hospital charges.

Another survey on a small scale in Ohio, Connecticut, and Vermont in 1953-54 found that 69 percent of the 1,657 persons studied had hospital prepayment coverage, but this level appears to be sectional in nature (7).

Some comparisons can be made between the Health Information Foundation survey of 1953 and the Public Health Service survey of 1956 with respect to coverage according to socioeconomic characteristics. Table 8 sets forth direct results of the two surveys, based on the noninstitutional civilian population.

Between 1953 and 1956 coverage increased 11 percent nationally, but in rural nonfarm areas it increased 24 percent. Rural nonfarm areas include communities below 2,500 in population and the nonurban fringes of large cities, where it may be assumed that rapid growth in population is principally of urban-oriented families.

Persons aged 65 years or over with prepayment coverage have increased from 31 percent in 1953 to 36.5 percent in 1956, a proportional gain of 18 percent. A more extensive analysis of the original data of the 1956 survey relating to persons 65 and over has been carried out through special tabulations developed for the Social Security Administration (8).

Levels of prepayment coverage for selected industries in the two studies are shown in table 8 because of their general similarity, although in some cases the reporting bases are different. Distribution of coverage by family income groups also shows fairly close similarity, although income groups were not identical.

Summary

The type and extent of prepayment protection against the costs of hospital care were studied in a national household survey in 1956. A sample of about 27,000 families with 90,000 persons of all ages was interviewed, with sample areas in every State. Hospital prepayment coverage was carried by 63.6 percent of the noninstitutional civilian population. This may be compared with a level of 57 percent found by a Health Information Foundation study in 1953. Hospital and surgical expenses were covered in 1956 for 49.2 percent of the population; hospital expenses only, for 8.4 per-

cent; and other hospital benefits (other combinations of service or other single services), for 6.0 percent.

Table 8. Patterns of hospital prepayment coverage by socioeconomic characteristics, 1953 and 1956

Socioeconomic characteristic	Percent of civilian noninstitutional population covered		
	HIF survey, July 1953 ¹ (Base: 8,846 persons)	PHS survey, September 1956 (Base: 90,000 persons)	Percent increase
<i>Place of residence</i>			
All areas	57	63.6	11
Urban	64	68.2	7
Rural nonfarm	52	64.4	24
Rural farm	38	40.3	6
<i>Age</i>			
Under 6	56	2 64.1	-----
6-17	58		
18-24	49	3 60.8	-----
25-34	64	70.8	11
35-44	65	71.5	10
45-54	63	68.5	9
55-64	54	62.6	16
65 and over	31	36.5	18
<i>Employment⁴</i>			
Manufacturing	87	84.9	(5)
Mining	89	6 81.5	(5)
Transportation	74	81.3	(5)
Professional services	72	74.5	(5)
Trade	67	70.8	(5)
Construction	57	59.0	(5)
Agriculture	6 33	32.6	(5)
<i>Family income</i>			
All incomes	57	65.2	14
Under \$1000	26	18.4	-----
\$1000-\$1999		31.6	-----
\$2000-\$2999	7 48	47.3	-----
\$3000-\$3999	8 64	65.2	-----
\$4000-\$4999		74.8	-----
\$5000-\$7499	71	81.3	14
\$7500-\$9999	71	83.6	-----
\$10,000 and over		80.1	-----

¹ See reference 5.

² Under 14 years.

³ 14-24 years.

⁴ Coverage basis, 1953 study: percent of families; 1956 study: percent of persons 14 years and over.

⁵ Not fully comparable.

⁶ Includes forestry and fisheries.

⁷ \$2,000-\$3,500.

⁸ \$3,500-\$4,999.

The most important contrasts in the extent of prepayment protection are associated with variation in income. In primary families with incomes of less than \$1,000 only 18 percent of the members had protection of any kind. The highest coverage rate was 83.6 percent in families with incomes between \$7,500 and \$10,000. Differences in the rate of prepayment coverage were also great with respect to type of employment: wage and salary workers in agriculture had only 26.5 percent coverage, while those in manufacturing had 84.9 percent. Age, too, was related notably to extent of coverage. Persons 65 years or over had a coverage rate of 36.5 percent, while maximum coverage amounted to 71.5 percent at ages 35 to 44 years. People living on farms had a total coverage of only 40.3 percent. Persons with low incomes had a lower proportion of their total coverage under Blue Cross and Blue Shield than did persons of above-average incomes.

These patterns of hospital prepayment coverage in 1956 provide a benchmark in a rapidly changing field. They also underscore those aspects of our social fabric in which health care is uncertain.

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Do We Spend Enough Dollars to Defend Our Lives Thru Medical Research? Picture story. 1959. National Health Education Committee, Inc., 135 East 42d Street, New York 17, N.Y.; \$2.95.

A study of some 200,000 life insurance policyholders contributes striking evidence that regular cigarette smokers are subject to increased risk of dying from lung cancer, as well as cardiovascular disease, certain respiratory diseases, ulcers, and cirrhosis of the liver.

Tobacco Consumption and Mortality From Cancer and Other Diseases

HAROLD F. DORN, Ph.D.

IN 1954 the Public Health Service in cooperation with the Veterans Administration initiated a study of the causes of death among policyholders of U.S. Government life insurance. This insurance was available only to persons who served in the Armed Forces of the United States between 1917 and 1940. Although most of the policyholders were veterans of World War I, an appreciable number first served after that date. All except less than 0.5 percent of the policyholders included in this study were men.

Method of Study

Beginning in January 1954, a questionnaire requesting information concerning the use of tobacco, usual occupation, and industry was mailed to each policyholder. Usable replies were received from 198,926 persons, or 68 percent of those included in the original mailing. A second questionnaire was mailed to nonrespondents beginning in January 1957. Usable replies were received from an additional 50,000 policyholders, making a total of approximately 249,000, or 85 percent of the number included in the study, for whom information concerning the use of tobacco, occupation,

and residence is available. The nonrespondents have been retained in the study, and the same medical information is available for them as for the respondents.

Whenever a claim is filed for the payment of a policy, the Veterans Administration forwards a copy of the death notice, usually a copy of the official death certificate, to the Public Health Service. Additional medical information, including verification of the causes of death

Dr. Dorn is chief of the Biometrics Branch, Division of Research Services, National Institutes of Health, Public Health Service. This paper is an expanded version of one he presented before the Seventh International Cancer Congress in London, July 8, 1958, which will be published in the Acta, Unio Internationalis Contra Cancrum, during 1959.

The study was carried out in cooperation with the Field Investigations and Demonstrations Branch, National Cancer Institute, Dr. R. F. Kaiser, chief. Dr. W. S. Baum, Division of Indian Health, Public Health Service, assisted in planning and initiating the study.

The Veterans Administration, whose cooperation made the study possible, is nevertheless not responsible for, nor does it necessarily endorse, any of the findings or conclusions of this report.

Definitions

SMOKING HISTORY

Persons were classified by smoking history in accordance with the following definitions.

Used tobacco: Persons who had smoked at least 5 to 10 packs of cigarettes or 50 to 75 cigars or 3 to 5 packages of pipe tobacco.

Smoked occasionally only: Persons who had never regularly smoked any form of tobacco but who had occasionally smoked one or more forms. Also included here were persons with unknown amount used either currently or in the past, provided that the maximum amount of known use was occasional only.

Regular smoker: Persons who at sometime during their lifetime had regularly smoked cigars, cigarettes, or pipe tobacco. These were further classified by the form of tobacco used and whether or not they were smoking at the start of the study in 1954.

Regular smoker, cigarette only: Persons who had regularly smoked only cigarettes. They may have occasionally smoked cigars or a pipe, but they had never smoked either of these regularly.

Regular smoker, cigarette and cigar: Persons who had regularly smoked both cigarettes and cigars. They may have smoked a pipe occasionally but never regularly. Similar definitions were used for regular smokers of other combinations of tobacco.

Amount unknown: Persons who stated they had smoked more than the minimum amount to qualify as a user of tobacco but who did not report the amount used either currently or in the past with sufficient accuracy to permit assignment to one of the groups of regular or occasional smokers.

Amount used: In this report, classification by amount of tobacco used is based on the current amount used at the time the questionnaire was filled

out in 1954. Regular smokers of (a) cigarettes and cigars, (b) cigarettes and pipe, and (c) cigarettes, cigars, and pipe were classified by the current number of cigarettes smoked. Regular users of cigars and pipes were classified by the current number of cigars smoked.

CAUSE OF DEATH

The broad groups of causes of death used in this study (table 4 and fig. 5) include the following categories of the International Statistical Classification of Diseases, Injuries, and Causes of Death (seventh revision, 1955):

Cancer of lung: 162, 163.

Cancer except lung: 140-205, except 162, 163.

Respiratory diseases:

Respiratory tuberculosis: 001-008.

Asthma: 241.

Influenza and pneumonia: 480-493.

Bronchitis: 500-502.

Emphysema without bronchitis: 527.1.

Other respiratory diseases: 470-475; 527.0; 527.2; 510-526.

Accidents:

Motor vehicle accidents: 810-835.

Other accidents: 800-802; 840-962; 980-991.

Suicide: 970-979.

Cardiovascular diseases:

Cerebral vascular lesions: 330-334.

Rheumatic fever: 400-402.

Chronic rheumatic heart disease: 410-416.

Arteriosclerotic heart disease: 420.

Nonrheumatic chronic endocarditis: 421-422.

Other heart disease: 430-434.

Hypertension with mention of heart disease: 440-443.

Hypertension without mention of heart disease: 444-447.

General arteriosclerosis: 450.

Other circulatory system disease: 451-468.

Chronic nephritis: 592-594.

Other diseases: Remaining categories.

entered on the death certificate, the procedures used to establish these diagnoses, whether the deceased had cancer even though it was not considered to be an underlying or contributory cause of death, and the histological type of cancer, is requested from the physician who signed the death certificate or from the hospital where the death occurred.

Verification of the cause of death is not re-

quested whenever the death occurs outside the United States, is due to an accident, or is certified by a coroner. Replies have been received to more than 99 percent of the letters of inquiry.

The underlying cause of death was changed for 6 percent of the deaths for which a comparison could be made between the entry on the official death certificate and the subsequent in-

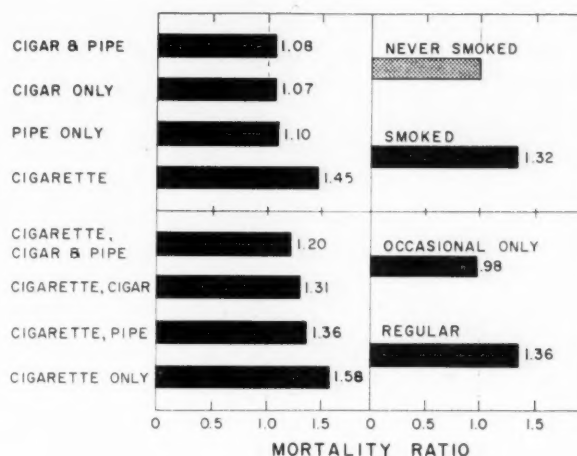
formation received in response to the letters of inquiry. Additional diseases contributory to death were reported for another 12 percent of the deaths, although the underlying cause was unchanged.

An autopsy had been made in nearly one-third (31 percent) of the deaths for which information concerning method of diagnosis was obtained. For about one-half of the deaths (47 percent) the diagnoses were established by exploratory surgery, endoscopy, radiography, or various laboratory tests. The diagnoses of the remaining one-fifth (22 percent) of the deaths were based upon physical examination and clinical history.

Basis of This Report

This report is based on deaths occurring during the 2½-year period July 1954–December 1956 among persons for whom information concerning use of tobacco was obtained prior to July 1954. Deaths during the first 6 months of 1954 have been excluded since the original questionnaire about the use of tobacco was mailed during this period. In addition to persons who died before they received a questionnaire, replies were not received from some persons who were seriously ill when the questionnaire was received; any deaths among these persons were

Figure 1. Mortality of smokers and nonsmokers; ratio of observed to expected number of deaths.



assigned to the group of nonrespondents. Although the death rate of the entire group of policyholders was not changed by this exclusion, the rates for both the nonrespondents and the respondents were biased since a disproportionate number of deaths had to be assigned to the nonrespondent group. Inspection of the data revealed that the effect of this bias had largely disappeared by July 1954.

The following data are based on 478,952 person-years exposure, of which 89,774 were contributed by persons who had never smoked

Table 1. Mortality of smokers and nonsmokers: Ratio of observed to expected number of deaths (all causes), by smoking history and current use, July 1954–December 1956

Smoking history	Number of person-years exposure	Current use		
		Total	Smokes	Does not smoke
Never smoked	89,774	1.00		
Used tobacco	389,178	1.32	1.37	1.24
Occasionally only	28,144	.98	.91	1.05
Regular smoker	339,903	1.36	1.40	1.30
Cigarette total	271,757	1.45	1.54	1.30
Cigarette only	161,172	1.58	1.65	1.39
Cigarette and other	110,585	1.29	1.35	1.21
Cigarette and cigar	21,188	1.31	1.34	1.27
Cigarette and pipe	53,168	1.36	1.41	1.26
Cigarette, cigar, pipe	36,229	1.20	1.28	1.11
Cigar only	28,422	1.07	.94	1.44
Cigar and pipe	21,944	1.08	1.04	1.21
Pipe only	17,780	1.10	1.05	1.25
Amount unknown	21,131	1.06	1.43	1.05

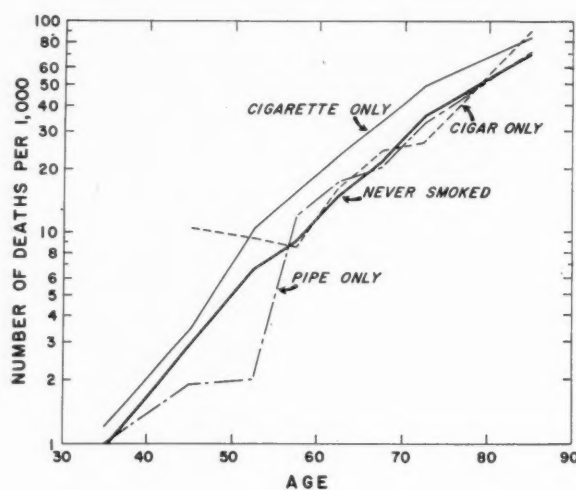
NOTE: Expected number of deaths computed by multiplying the number of person-years exposure in each age group for each smoking history category by the age-specific death rates of persons who had never smoked.

and 389,178 by persons who had smoked tobacco in some form during their lifetime. The number of person-years exposure of persons classified by type of smoking history is shown in table 1.

Unless otherwise specified, the death rate for smokers is expressed as a ratio to that for persons who have never smoked. This mortality ratio is calculated by dividing the number of observed deaths for each smoking history group by the number of expected deaths based on the age-specific death rates of persons who have never smoked. The ratio of 1.32 shown in table 1 for persons who have smoked tobacco at some time means that the death rate for these persons from all causes combined is 32 percent greater than the rate for persons who have never smoked.

The mortality ratio as used here is a measure of the relative excess mortality of smokers compared with nonsmokers. An equally valid measure would be the absolute difference between the observed and the expected number of deaths. The total number of excess deaths, if any, may be apportioned among the various individual causes of death, thus ranking the causes according to the proportion of the total excess number of deaths for which they are responsible. These two measures are designed to emphasize different aspects of the variation in mortality between two groups. The main interest in this paper is the relative difference

Figure 2. Death rate of regular smokers and nonsmokers by age and type of tobacco used.



in the death rate of smokers and nonsmokers; therefore, the mortality ratio will be used exclusively.

Mortality by Type of Smoking

The largest increase in mortality among persons who have smoked is found for those who have regularly smoked only cigarettes (fig. 1). The death rate for these smokers is 58 percent greater than that for nonsmokers. Persons who have smoked regularly only cigars, only a pipe, or cigars and a pipe die at a rate

Table 2. Mortality by age among smokers and nonsmokers: Number of deaths per 1,000 per year, by smoking history and age, July 1954–December 1956

Smoking history	Number of deaths	Death rate per 1,000								
		All ages	30-39	40-49	50-54	55-59	60-64	65-69	70-74	75 and over
Never smoked	1, 179	13. 1	0. 7	2. 9	6. 6	9. 0	14. 8	21. 6	35. 8	70. 0
Used tobacco	6, 203	15. 9	1. 3	3. 2	9. 3	13. 1	19. 0	28. 1	38. 6	73. 3
Occasionally only	345	12. 3	2. 0	2. 7	3. 2	9. 5	12. 9	23. 6	30. 6	85. 2
Regular smoker	5, 564	16. 4	1. 3	3. 4	9. 8	13. 6	19. 8	28. 9	39. 6	72. 6
Cigarette total	4, 513	16. 6	1. 4	3. 3	10. 4	14. 4	20. 9	31. 2	43. 5	72. 8
Cigarette only	2, 771	17. 2	1. 2	3. 4	10. 4	15. 3	22. 9	33. 4	49. 8	84. 7
Cigarette and other	1, 742	15. 8	1. 8	3. 1	10. 4	13. 0	18. 1	28. 8	37. 4	62. 9
Cigarette and cigar	363	17. 1	3. 0	7. 4	10. 2	10. 5	17. 8	37. 0	43. 6	48. 2
Cigarette and pipe	805	15. 1	1. 4	2. 0	10. 1	14. 1	19. 3	28. 3	34. 9	73. 5
Cigarette, cigar, pipe	574	15. 8	2. 2	4. 5	11. 0	12. 8	16. 7	24. 5	36. 3	62. 5
Cigar only	433	15. 2	. 0	10. 4	9. 3	8. 5	16. 3	24. 1	26. 7	89. 6
Cigar and pipe	342	15. 6	. 0	2. 3	7. 3	11. 1	15. 8	23. 5	34. 6	56. 5
Pipe only	276	15. 5	1. 0	1. 9	2. 0	11. 8	17. 2	20. 6	32. 4	71. 7
Amount unknown	294	13. 9	. 7	. 0	7. 8	10. 2	15. 6	22. 9	33. 8	67. 8

Table 3. Mortality of regular smokers by current amount smoked: Ratio of observed to expected number of deaths (all causes), by smoking history and current amount smoked in 1954, July 1954–December 1956

Smoking history	Ratio of observed to expected deaths					Number of observed deaths				
	Current number of cigarettes smoked per day									
	Occa- sional	Less than 10	10-20	21-39	40 or more	Occa- sional	Less than 10	10-20	21-39	40 or more
Cigarette only.....	0. 96	1. 29	1. 66	1. 77	1. 99	25	205	1, 019	663	137
Cigarette and other.....	1. 08	. 95	1. 37	1. 72	1. 79	72	159	492	319	59
Cigarette and cigar.....	1. 08	. 90	1. 30	1. 75	2. 71	13	35	91	56	19
Cigarette and pipe.....	1. 00	1. 03	1. 36	1. 88	1. 40	27	71	252	180	21
Cigarette, cigar, pipe.....	1. 14	. 88	1. 41	1. 46	1. 73	32	53	149	83	19
Cigar only..... Cigar and pipe.....	Current number of cigars smoked per day									
	Occa- sional	1-2	3-4	5-8	9 or more	Occa- sional	1-2	3-4	5-8	9 or more
	1. 05	0. 71	1. 00	0. 99	1. 44	20	62	97	79	26
	. 93	1. 16	. 99	. 87	1. 33	40	101	67	32	8
	Current number of pipefuls smoked per day									
Pipe only.....	Occa- sional	Less than 5	5-9	10-19	20 or more	Occa- sional	Less than 5	5-9	10-19	20 or more
	0. 86	0. 96	1. 12	0. 98	1. 21	6	44	73	45	29

NOTE: Expected number of deaths computed by multiplying the number of person-years exposure in each age group for each smoking history category by the age-specific death rates of persons who had never smoked.

only slightly in excess of that for nonsmokers. Individuals with a history of regularly smoking cigars or a pipe, or both, in addition to cigarettes are subject to a mortality rate definitely greater than that for nonsmokers but less than the rate for persons who have smoked regularly only cigarettes. Occasional smoking, irrespective of the form of tobacco used, apparently has no effect upon the total death rate.

On January 1, 1954, the policyholders included in this study varied in age from 30 years to more than 80 years. The vast majority, 84 percent, were between 50 and 70 years of age; only 2 percent were more than 70 years old.

The age-specific death rates presented in table 2 and figure 2 show the same relationship between the death rate from all causes and smoking history as the average rates for all ages

combined given in table 1. The relative amount of the excess mortality of regular smokers in comparison with that of nonsmokers decreases after age 70, but this finding cannot be regarded as firmly established because of the small number of persons who were more than 70 years old at the start of the study.

Mortality of Ex-Smokers

Regular cigarette users who had stopped smoking prior to the start of the study in 1954 have a lower death rate than persons who continued to smoke (table 1). Nevertheless their death rate on the average still exceeds that for nonsmokers by 30 percent. The largest absolute decrease in the mortality ratio is found for ex-smokers who have regularly smoked cigarettes only; their mortality ratio is 1.39 com-

pared with 1.65 for persons who were still smoking cigarettes.

The much higher mortality among men who have smoked regularly only cigarettes is emphasized by the fact that the mortality ratio for those who have stopped smoking, 1.39, is slightly greater than the ratio, 1.35, for persons who were continuing to smoke cigarettes in combination with cigars or a pipe. Part of the difference in the death rates for these two groups of cigarette smokers is accounted for by the fact that persons who regularly smoke cigars or a pipe as well as cigarettes smoke fewer cigarettes per day, on the average, than do persons who regularly smoke only cigarettes. After adjusting for differences in age and average number of cigarettes currently smoked, the death rate from all causes combined for cigarette-only smokers is 14 percent greater than

that for persons who smoke cigars or a pipe in addition to cigarettes.

In contrast to cigarette smokers, ex-smokers of cigars and pipes are subject to a higher death rate than persons who continue to smoke these forms of tobacco. The death rate of those who were still regularly smoking cigars or a pipe in early 1954 does not differ significantly from that of persons who had never smoked, whereas the corresponding rate for ex-smokers ranged from 21 to 44 percent higher. This finding suggests that many of these ex-smokers may have stopped smoking because of ill health.

Whether or not this ill health may have been related to the use of tobacco is unknown.

Mortality by Current Amount Smoked

Two indexes of the amount of tobacco smoked are available for the persons included in this

Figure 3. Mortality of regular smokers by current amount smoked in 1954 and type of tobacco used; ratio of observed to expected number of deaths.

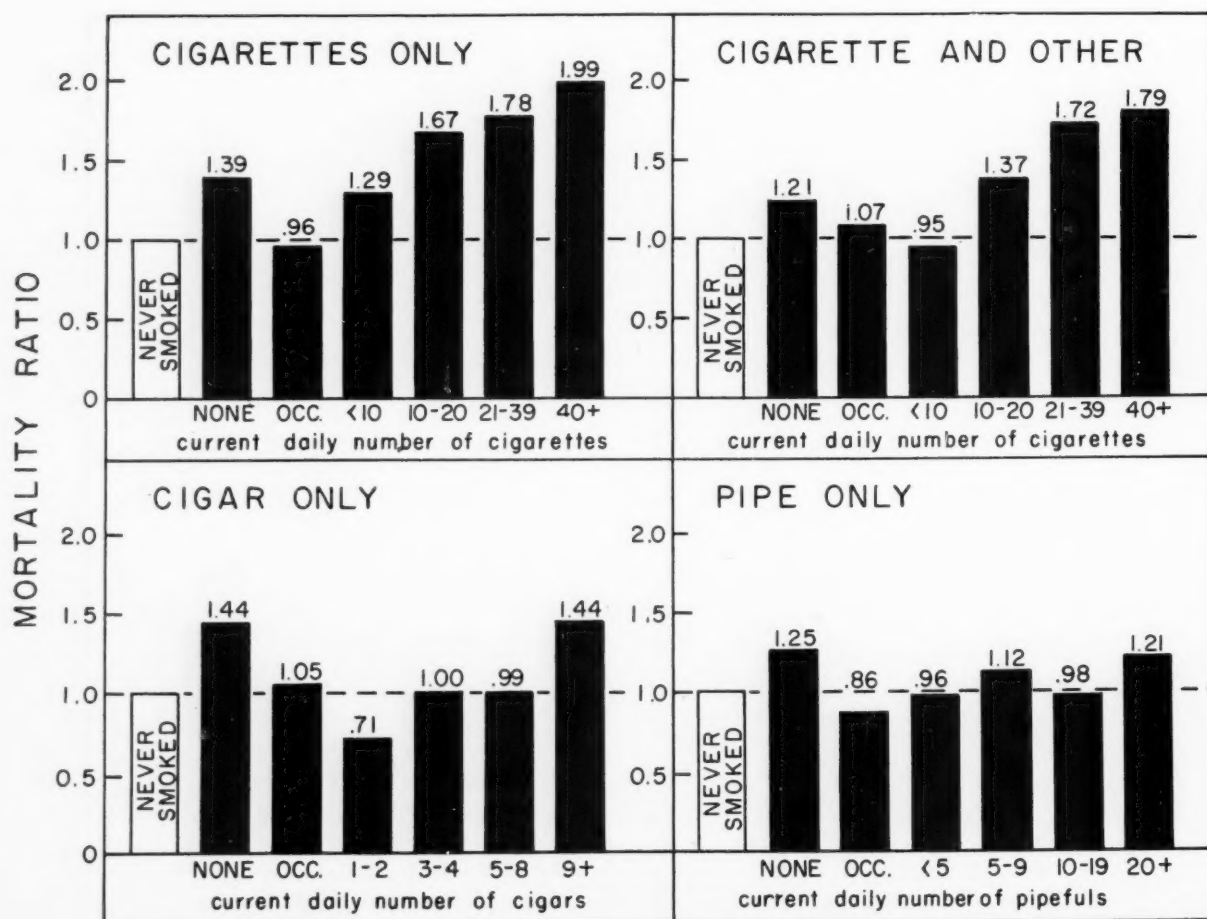


Table 4. Mortality of smokers from broad groups of causes: Ratio of observed to expected number of deaths, by smoking history and causes,¹ July 1954–December 1956

Smoking history	Ratio of observed to expected deaths ²						Number of observed deaths					
	Cancer of lung	Cancer, except lung	Respiratory diseases	Cardiovascular diseases	Suicide, accidents	Other diseases	Cancer of lung	Cancer, except lung	Respiratory diseases	Cardiovascular diseases	Suicide, accidents	Other diseases
Never smoked or smoked occasionally only.....	1.00	1.00	1.00	1.00	1.00	1.00	17	248	24	1,017	97	121
Used tobacco.....	6.00	1.26	1.66	1.27	.92	1.38	312	981	118	3,983	294	515
Regular smoker.....	6.64	1.30	1.80	1.31	.94	1.41	299	877	112	3,556	261	458
Cigarette total.....	8.32	1.30	2.24	1.40	.91	1.48	283	675	101	2,887	203	363
Cigarette only.....	9.35	1.30	2.76	1.53	.99	1.57	187	385	69	1,780	131	218
Cigarette and other.....	6.40	1.31	1.52	1.24	.79	1.36	96	290	32	1,107	72	145
Cigarette and cigar.....	7.00	1.42	1.00	1.23	.94	1.41	21	64	4	227	16	31
Cigarette and pipe.....	6.29	1.22	2.25	1.32	.75	1.49	44	122	18	518	33	70
Cigarette, cigar, pipe.....	6.20	1.35	1.25	1.14	.79	1.16	31	104	10	362	23	44
Cigar only.....	1.50	1.36	.43	1.00	.92	1.38	6	87	3	271	22	44
Cigar and pipe.....	2.00	1.48	.40	1.00	1.11	1.12	6	74	2	211	20	29
Pipe only.....	1.33	1.03	1.50	1.11	1.07	1.10	4	41	6	187	16	22
Amount unknown.....	2.00	1.00	.75	1.06	.71	1.45	6	45	3	196	12	32

¹ Underlying causes only.

² Expected number of deaths computed by multiplying the number of person-years exposure in each age group for each smoking history category by the age-specific death rates from each cause of death of persons who had never smoked or who had used tobacco only occasionally.

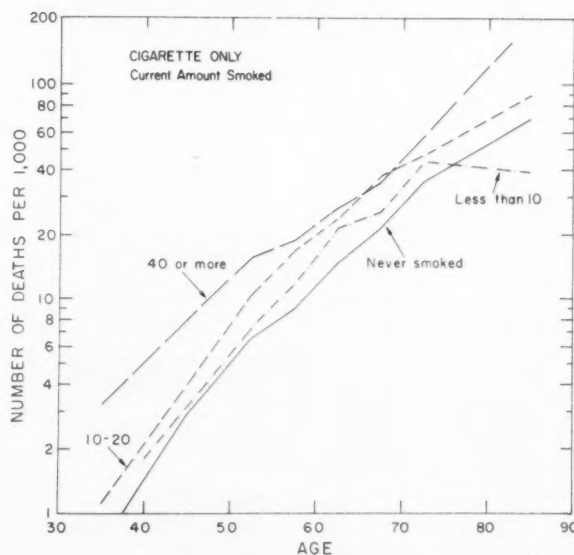
study: (a) the maximum amount ever regularly smoked, and (b) the amount currently smoked in early 1954. Table 3 and figure 3 present mortality ratios for persons currently smoking specified quantities of tobacco in 1954. All of these had smoked regularly at some time, even those smoking only occasionally at the time they completed the questionnaire.

The excess mortality of cigarette smokers is directly related to the average daily number of cigarettes smoked. Those who smoke two packs or more a day have the highest death rate—a rate averaging nearly twice that for nonsmokers. The death rates by age and current amount smoked for regular cigarette users presented in figure 4 show the same direct relationship with the average daily number of cigarettes smoked as do the rates for all ages combined in figure 3.

Only very heavy cigar or pipe smokers experience a higher mortality than nonsmokers. The death rates for the heaviest cigar or pipe smokers, those currently smoking 9 or more cigars or 20 or more pipefuls per day, are about

the same as the rate of persons who smoke from one-half to one pack of cigarettes per day. Among these smokers the mortality ratio is sig-

Figure 4. Death rate of nonsmokers and regular cigarette smokers by age and current amount smoked in 1954.



nificantly greater than one only for persons who regularly smoke cigars only and for the total of the three cigar- and pipe-smoking groups. These data lead to the conclusion that cigar or pipe smoking does not increase the total mortality rate unless large amounts of these forms of tobacco are consumed.

Classification of Deaths

Causes of death were classified according to the rules of the International Statistical Classification of Diseases, Injuries, and Causes of Death published by the World Health Organization. One underlying and a maximum of two contributory causes of death were coded. The selection of the underlying cause of death

was based on the opinion of the deceased's physician except when it was obvious that the physician had misunderstood the intent of the question and had selected a terminal condition such as pulmonary failure or edema as the underlying cause. In addition, a separate code was provided for cases with cancer which the physician stated was not a contributory or underlying cause of death.

The mortality ratios for broad groups of causes (table 4, fig. 5) are based on the underlying cause of death; hence there is only one cause for each death. The mortality ratios for the specific causes of death (figs. 6 and 7, table 5) were computed from both underlying and contributory causes, and for cancer they also in-

Figure 5. Mortality of smokers from broad groups of causes of death; ratio of observed to expected number of deaths; death rate of nonsmokers and persons who have smoked only occasionally equals 1.00.

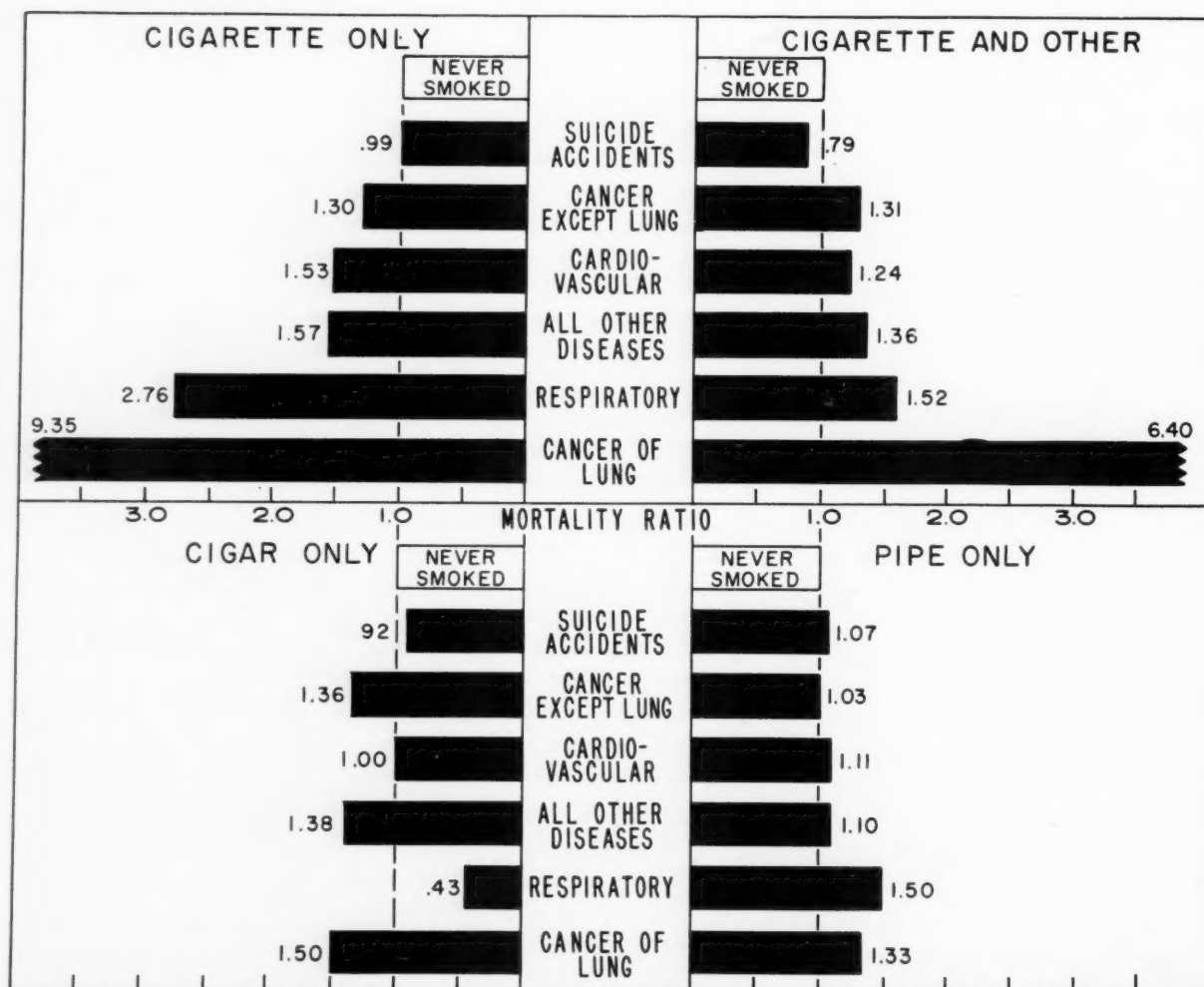
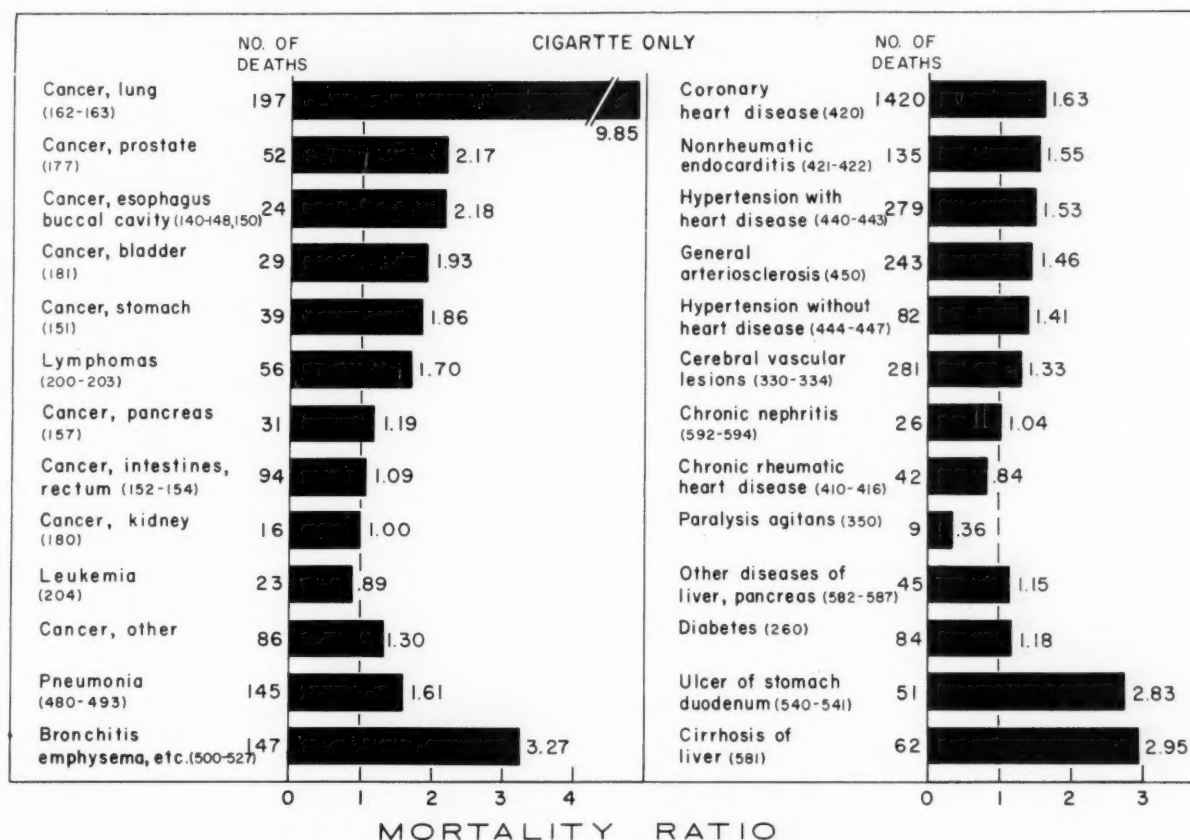


Figure 6. Mortality of regular smokers of cigarettes only from specific diseases; ratio of observed to expected number of deaths; death rate of nonsmokers and persons who have smoked only occasionally equals 1.00.



clude cases with a cancer which the physician stated did not contribute to death. Examples of the latter are skin cancer or clinically quiescent cancer of the prostate discovered during autopsy. One hundred and seventeen of the persons who died had a cancer which was not considered one of the causes of death by the attending physician. Eight of these were cancer of the lung.

The selection of one of several coexisting diseases as the underlying cause of death frequently must be rather arbitrary. In studies of the etiology of disease the important question is whether or not a given disease has developed, not whether this disease has been designated by some method as the underlying cause of death. Hence the data in figure 6 are based on the number of cases of a specified disease. If a policyholder had both diabetes and cancer of the lung, he was counted twice, once in the group with diabetes and once in the

group with cancer of the lung. Consequently, the sum of the numbers of observed deaths is greater than the number of persons who died.

The expected number of deaths on which the mortality ratios by cause are based were computed from the death rates for persons who had never smoked and those who had smoked only occasionally in order to have a statistically more stable basis of comparison. The only cause in table 4 for which the death rates for these two groups differed appreciably is cancer of the lung. There were 10 deaths among persons with lung cancer from the 89,774 person-years exposure of the never-smoked group and 7 deaths from the 28,144 person-years exposure of persons who smoked only occasionally. The corresponding crude death rates were 11 and 25 per 100,000, but this difference is not statistically significant. For simplicity of expression the combined group will be referred to as having never smoked.

Mortality From Broad Cause Groups

By far the greatest increase for smokers in the risk of developing a disease is that for lung cancer. For all persons who had ever smoked the observed number of cases of lung cancer was 312 compared with 52 expected, a mortality ratio of 6.0 (table 4). However, the amount of the increased risk varies widely among the various groups of smokers, ranging from an excess of 33 percent for pipe smokers to 835 percent for cigarette-only smokers. The mortality ratio for none of the three cigar-pipe-smoking groups differs significantly from one; the ratio for the three combined, 1.60, is barely significant at the 5 percent level.

For no other disease does the excess mortality among smokers approach that for lung cancer. The next highest mortality ratio is for a group of respiratory diseases including pulmo-

nary tuberculosis, asthma, bronchitis, emphysema, pneumonia, and pleurisy (fig. 5). Although these diseases are important causes of morbidity, they are numerically unimportant as primary, or underlying, causes of death; only 118 deaths among smokers and 24 deaths among nonsmokers were due directly to one of this group of diseases. The majority of these deaths were attributed to bronchitis, emphysema, pleurisy, empyema, fibrosis of the lung, and similar conditions.

An increased death rate from this group of respiratory diseases is found only among regular cigarette smokers, for whom the mortality ratio is 2.24. As for lung cancer, the highest ratio for respiratory diseases, 2.76, is for persons who smoke cigarettes only. Although the number of deaths among persons who regularly smoke only cigars or a pipe is small, there is

Figure 7. Mortality of regular smokers of cigarettes only, by current amount smoked in 1954 and specific disease; ratio of observed to expected number of deaths; death rate of nonsmokers and persons who have smoked only occasionally equals 1.00.

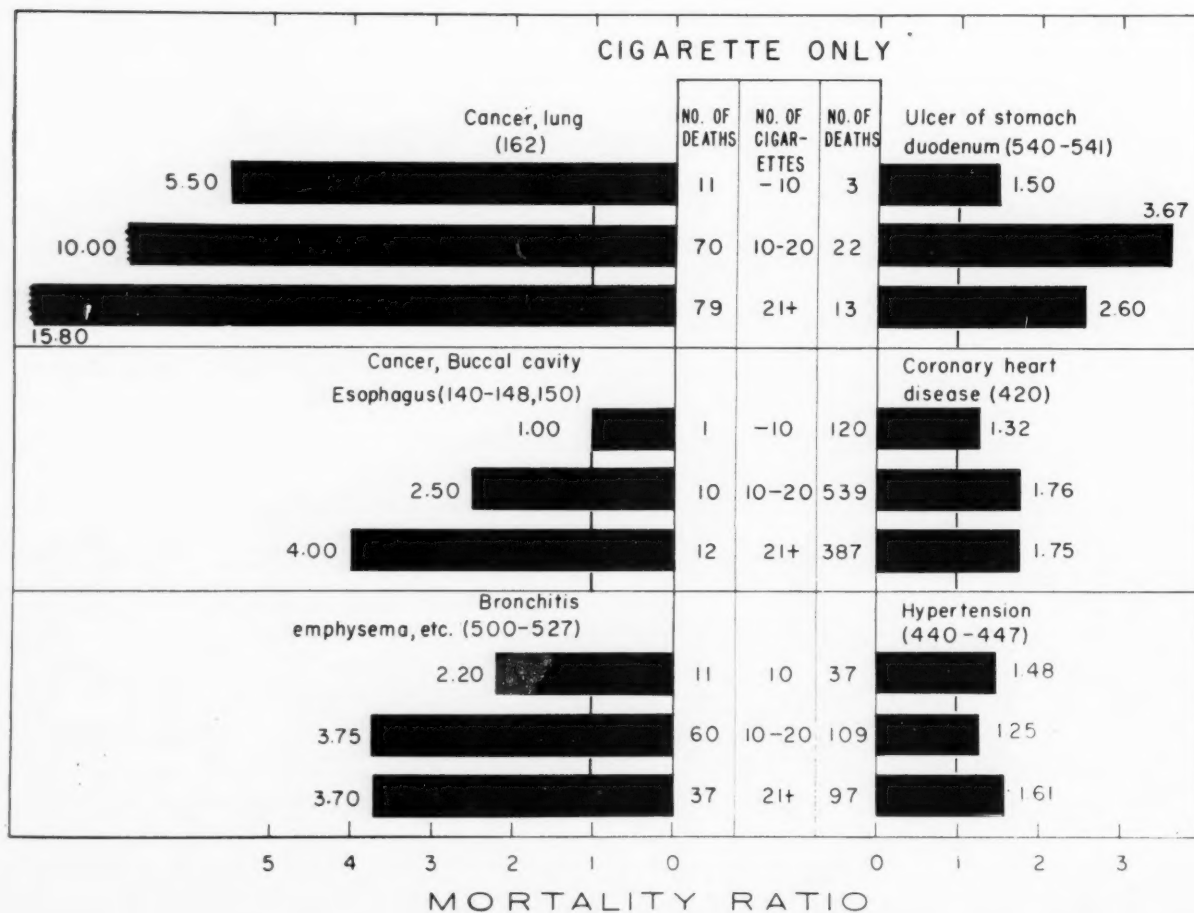


Table 5. Mortality of regular cigarette smokers from specific diseases by amount smoked: Ratio of observed to expected number of deaths of persons who had regularly smoked cigarettes only, by current amount smoked in 1954, July 1954–December 1956¹

Disease	Ratio of observed to expected deaths ²			Number of observed deaths		
	Current amount smoked					
	Less than 10	10-20	21 or more	Less than 10	10-20	21 or more
Cancer of lung (162, 163)-----	5. 50	10. 00	15. 80	11	70	79
Cancer of prostate (177)-----	1. 67	2. 00	2. 33	5	16	14
Cancer of mouth, pharynx, and esophagus (140-148, 150)-----	1. 00	2. 50	4. 00	1	10	12
Cancer of bladder (181)-----	1. 00	1. 83	2. 75	2	11	11
Cancer of stomach (151)-----	4. 50	2. 00	1. 40	9	14	7
Malignant lymphomas (200-203)-----	. 67	1. 91	1. 89	2	21	17
Cancer of pancreas (157)-----	. 67	1. 00	2. 00	2	9	14
Cancer of intestines and rectum (152-154)-----	1. 22	1. 00	1. 14	11	30	25
Cancer of kidney (180)-----	1. 50	1. 17	. 75	3	7	3
Leukemia (204)-----	. 33	. 78	1. 43	1	7	10
Cancer, other forms-----	1. 00	1. 39	1. 39	7	32	25
Pneumonia (480-493)-----	1. 70	1. 78	1. 82	17	57	40
Bronchitis, emphysema, and allied diseases (500-527)-----	2. 20	3. 75	3. 70	11	60	37
Arteriosclerotic (coronary) heart disease (420)-----	1. 32	1. 76	1. 75	120	539	387
Nonrheumatic chronic endocarditis (421-422)-----	1. 30	1. 68	1. 62	13	52	34
Hypertension with heart disease (440-443)-----	1. 32	1. 34	1. 63	25	87	75
General arteriosclerosis (450)-----	. 84	1. 62	1. 46	16	97	57
Hypertension without heart disease (444-447)-----	2. 00	1. 10	1. 57	12	22	22
Cerebral vascular lesions (330-334)-----	1. 54	1. 27	1. 46	37	95	73
Chronic nephritis (592-594)-----	0	1. 00	1. 14	0	9	8
Chronic rheumatic heart disease (410-416)-----	. 80	. 94	. 77	4	16	10
Paralysis agitans (350)-----	. 33	. 11	. 17	1	1	1
Other diseases of liver, gallbladder, and pancreas (582-587)-----	1. 00	. 64	1. 50	4	9	15
Diabetes (260)-----	. 62	. 96	1. 39	5	24	25
Ulcer of stomach and duodenum (540-541)-----	1. 50	3. 67	2. 60	3	22	13
Cirrhosis of liver (581)-----	3. 00	3. 14	4. 17	6	22	25

¹ Underlying and contributory causes of death.

² Expected number of deaths computed by multiplying the number of person-years exposure in each age group by the age-specific death rates from each cause of death (including underlying and contributory causes) of persons who had never smoked or who had used tobacco only occasionally.

no evidence that this group experiences a higher death rate from these respiratory diseases than do nonsmokers.

Nearly two-thirds of the deaths of persons who had used tobacco were attributed to diseases of the cardiovascular-renal system, including chronic nephritis, arteriosclerosis, hypertension, rheumatic heart disease, chronic endocarditis, and coronary occlusion, sclerosis, and thrombosis. The risk of dying from one or more of these diseases is 31 percent greater for regular smokers than for nonsmokers. Again, the risk is greater for regular cigarette users, especially those who have smoked only

cigarettes, than it is for users of other forms of tobacco. There is no indication that regular cigar or pipe smokers experience a higher death rate than nonsmokers.

The mortality ratios for cancer other than cancer of the lung are similar in magnitude to those for cardiovascular diseases except that the ratios for cigar and pipe smokers are as high as those for cigarette smokers. The mortality from these forms of cancer will be discussed in more detail below.

Smokers have no greater risk of committing suicide or of being killed in an accident than do nonsmokers.

Mortality From Specific Causes

As was pointed out above, the death rates for each of the specific diseases include all patients with the disease at the time of death, irrespective of whether or not it was considered the underlying cause. However, a disease was not coded in the absence of evidence that it was clinically active.

Diseases with a mortality ratio greater than 2.0, signifying a death rate more than double that for nonsmokers, are bronchitis, emphysema, and allied respiratory diseases, cirrhosis of the liver, ulcer of the stomach or duodenum, cancer of the prostate, and cancer of the esophagus and buccal cavity (fig. 6). Several studies have reported that heavy smokers also tend to drink alcoholic liquors excessively so that the increased death rate from cirrhosis of the liver may reflect the effect of the consumption of alcohol rather than any effect of cigarette smoking. An increased mortality of cigarette smokers from the other diseases mentioned has been reported in other studies also. An explanation of the high mortality ratio for cancer of the prostate is not apparent.

The death rates from the principal cardiovascular diseases are from 33 percent to 63 percent greater for regular cigarette-only smokers than for nonsmokers. No increase in mortality exists for chronic rheumatic heart disease or for chronic nephritis.

Mortality ratios by current amount smoked for men who were regularly smoking cigarettes only are shown in table 5. The number of observed deaths for several diseases is not large enough to establish that the mortality ratio for heavy smokers is significantly greater or less than the ratio for light smokers. Among these diseases are cancer of the stomach and cancer of the kidney, for which the death rates are lower for heavy than for light smokers, and cancer of the bladder, cancer of the pancreas, and leukemia, for which the death rates are higher for heavy smokers than for light smokers.

But for cancer of the lung and cancer of the buccal cavity and esophagus, the death rate increases rapidly with an increase in the average daily number of cigarettes smoked. The death rate from lung cancer for men who regularly were smoking more than a pack of cigarettes a

day is nearly 16 times the rate for nonsmokers (fig. 7). A similar, although numerically smaller, increase in the mortality ratio with an increase in the number of cigarettes smoked exists also for cancer of the buccal cavity (lip, tongue, mouth, pharynx) and esophagus.

The leading cause of death of the policyholders included in this study is coronary heart disease. Although no difference was found in the death rates for moderate and heavy smokers, those smoking more than 10 cigarettes per day, these rates are greater than that for persons smoking less than 10 cigarettes per day. The difference, however, is considerably less than the corresponding difference for lung cancer. The death rates from hypertension, cerebral vascular lesions, chronic nephritis, and chronic rheumatic heart disease are no higher for heavy than for light smokers.

Summary

1. This report summarizes the mortality experience of nearly 200,000 policyholders of U.S. Government life insurance from July 1954 through December 1956. All these policyholders served in the Armed Forces of the United States between 1917 and 1940.

2. The death rate from all causes for men who have used tobacco is 32 percent greater than that for men who have never smoked.

3. Men who have smoked regularly only cigarettes have the highest death rate of all groups of smokers, 58 percent greater than the rate for nonsmokers.

4. The death rate from all causes for men who have regularly smoked cigars or a pipe, or both, is not appreciably higher than that for nonsmokers.

5. Regular cigarette smokers who had stopped smoking cigarettes before the study began in 1954 have a lower mortality rate than those who continued to smoke. However, the rate for the ex-smokers still is 31 percent greater than that of nonsmokers.

6. The excess mortality of regular cigarette smokers is greater for heavy smokers than for light smokers. Only the heaviest users of cigars and pipe tobacco experience a significant increase in total mortality over that of men who have never smoked.

7. The greatest increase for smokers in the risk of developing a disease is for cancer of the lung. The mortality ratio for regular smokers of cigarettes only is 9.85, or about 10 times that for nonsmokers. The death rate for men smoking more than a pack of cigarettes a day is 16 times that of nonsmokers.

8. Regular users of cigars or a pipe, or both, have an increased mortality rate for cancer of the lung as well as for all forms of cancer as a group, but this increase is much less than that for cigarette smokers.

9. Regular cigarette smokers are subject also to an increased risk of dying from cardiovascular disease, from certain respiratory diseases such as bronchitis, pleurisy, and emphysema,

from ulcers of the stomach and duodenum, and from cirrhosis of the liver.

10. The death rate from coronary heart disease among regular users of cigarettes only is 63 percent higher than the rate for nonsmokers.

11. The leading cause of death among the policyholders is coronary heart disease. Forty-four percent of the number of observed deaths and 45 percent of the number of excess deaths—the difference between the number of observed deaths and the number of deaths expected on the basis of the rates for nonsmokers—for cigarette-only smokers were attributed to coronary heart disease. Corresponding percentages for lung cancer were 7 and 17.

Institutes in Care of Premature Infants

Announcement of the 1959-60 schedule of the institutes for physicians and nurses in the care of premature infants at the New York Hospital-Cornell Medical Center marks the 11th year of this service. The institutes are sponsored by the New York State Department of Health and the Children's Bureau.

Designed to meet the needs of physicians and nurses in charge of hospital premature nurseries and special premature centers, and medical and nursing directors and consultants in State and local premature programs, each course is limited in attendance to six physician-nurse teams. The program for physicians is of 2 weeks' duration and for nurses, 4 weeks. Participants pay no tuition and stipends are provided to assist with expenses during attendance.

Early application is essential for the 1959-60 institutes, which will start in 1959 on September 21 and November 2; in 1960, January 4, February 8, and May 9.

Additional information may be obtained by writing Box 143, Institute in the Care of Premature Infants, New York Hospital, 525 East 68th Street, New York 21, N.Y.

Signs

and

Symptoms

of trends in public health

The relationship of exercise to coronary heart disease is the subject of a study by J. N. Morris, F.R.C.P., D.P.H., and Margaret D. Crawford, M.D., of London Hospital printed in the *British Medical Journal* (December 20, 1958). The authors suggest that the physical activity of work is a protection and that persons whose jobs involve little or no physical activity are relatively more vulnerable.

« »

Reduction of 17 percent in traffic deaths in Iowa during 1958 is attributed by Safety Commissioner Russell Brown largely to radar speed checks and a point plan for ruling reckless drivers off highways.

« »

Comfortable earplugs that would shut out deafening noises have been recommended by Dr. Aram Glorig, head of the American Academy of the Ophthalmology and Otolaryngology's research center on noise in industry. He says that workers who wear earplugs have normal hearing at the end of a working day. Those who do not wear plugs lose hearing, particularly at 4,000 cycles.

Some workers object to wearing earplugs, fearing that warning cries of danger would go unheard. Glorig says that the opposite is true. Loud noises are shut out by the plugs and speech is made more intelligible.

« »

The College of American Pathologists has supplied 180,000 practicing physicians with a booklet on cytodagnosis as an aid to early detection of cancer. The college plans to distribute copies to medical students graduating in the next 5 years.

The Virginia Farmers Union has protested a bill in the South Dakota legislature requiring that its cigarette tax stamps carry skull and crossbones.

« »

A new virus laboratory, in construction in Connecticut, will be equipped for cultural studies, particularly on poliomyelitis, ECHO and Coxsackie infections, smallpox, and herpes, for the Connecticut State Department of Health.

« »

Fires killed at least 11,500 persons and destroyed property valued at a record of \$1,305,000,000 during 1958, estimates the National Fire Protection Association. Loss of lives was 200 more than in 1957.

« »

The first major intensified tuberculin skin-testing program for urban public and parochial senior high school students and personnel is being conducted by the District of Columbia Health Department under grant of \$10,000 from the D.C. Tuberculosis Association.

« »

By 1980, industry will have to find safe ways to segregate 100 million gallons of highly radioactive waste materials having a radioactivity equal to 100 billion curies, Dr. Abel Wolman of the Johns Hopkins University testified in hearings before the Joint Congressional Committee on Atomic Energy. Dr. Wolman also said that rapid development of the atomic energy industry is in no small measure contingent on finding safe and economical methods of waste disposition.

Elderly people's needs of employment, health, nutritional, and housing services are under investigation in Paterson by the division of aging of the New Jersey Department of Health. Interviews are being conducted by 150 volunteers.

« »

Every driver-education car should be equipped with properly installed seat belts, and education in their use should be part of every driving course, according to Dr. A. L. Chapman, chief, Division of Special Health Services, Public Health Service.

« »

Three studies on ways to improve automobile driving were described by Dr. James L. Malfetti, executive officer of Columbia University's Safety Education Institute. The first study is measuring antisocial traits of traffic law violators; another is working on a method for selecting driver-training teachers likely to be most successful; and a third is studying driver behavior in critical situations.

« »

A record low disabling injury frequency rate of 2.98 each million man-hours worked during 1958 has been reported by the chemical industry, a 61 percent improvement over the 7.65 rate reported in 1946.

« »

The United States suicide rate was 9.8 persons for each 100,000 population in 1957, reports the National Office of Vital Statistics.

« »

The United States-Mexico Border Public Health Association reports a 60 percent growth in membership during 1958.

« »

Infants less than 1 year old who are tuberculin-positive, and children between 1 and 4 years of age for whom there is X-ray evidence of active, primary tuberculosis, should be treated with daily doses of isoniazid, the Public Health Service recommends on the basis of a study of 2,750 children.

Some Epidemiological Considerations in Rocky Mountain Spotted Fever

CORNELIUS B. PHILIP, Ph.D., Sc.D.

When the following paper was presented in its original form at the 15th International Congress of Zoology, in London, July 1958, the audience included a number of Soviet scientists who were interested in the relation between Rocky Mountain spotted fever and Siberian tick typhus. This relationship has evoked a resurgence of international interest in the spotted fever group of tickborne diseases, reflected here through references to Price and others. Although this paper is limited to observations in the Bitterroot Valley, it was presented with the comment that data still in process at the Rocky Mountain Laboratory appear to confirm ecologic and etiological similarities of Siberian tick typhus with Rocky Mountain spotted fever. A detailed table of hosts, which, as noted below, has been filed with the American Documentation Institute, was prepared specifically with regard to intensive studies by the Russians on rodent hosts of immature tick vectors.

IN the Bitterroot Valley of Montana, where the ecology of Rocky Mountain spotted fever has been longest under study, the common tick vector is *Dermacentor andersoni*, the immature stages of which feed on susceptible small animals. Adult ticks feed on relatively insusceptible large animals and accidentally infect man.

It has long been reported, and is still unexplained, that severe human infections have been acquired only on the west side of the Bitterroot Valley, and that elsewhere, also, levels of virulence vary consistently in different

parts of the range of *D. andersoni*. An average of only 1 to 3 percent of Bitterroot ticks, under varying environmental conditions, have been found to be infected in a 5-year intensive study made by Philip and Parker (unpublished paper). They also observed that the highest infection rate, 13.5 percent, in any one spot is among the precipitous, so-called "goat-rocks" on the west side.

Maintenance in Nature

In 1954 Price (1) reemphasized two factors that have long been considered by Ricketts, Parker, and others of prime importance in the natural persistence of the infectious agent: (a) transovarial passage through successive generations of the tick vectors, and (b) the starting of new lines of infection by the simultaneous feeding of infected and noninfected ticks on susceptible hosts, largely young rodents and rabbits or hares in the Rocky Mountain area of the United States. Since only part of the progeny of an infected female tick "inherit" the agent, Ricketts had logically calculated that the first factor alone would not adequately explain natural maintenance.

Furthermore, the mechanism of the second factor must be more limited than would appear on casual consideration. In the Bitterroot Valley, Columbian ground squirrels are the most numerous and important of the susceptible small animal hosts of immature *D. andersoni* (table 1), but significant differences of tick infestations on these or other rodents between the two sides of the valley are not apparent. Consideration of the difference between the biotic potential of the ticks (5,000 to 8,000 eggs per

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engorged female) and the observed natural balance (1 pair of adults replacing 1 female in the long run) is such that the tabulated 6.4 average larvae and nymphs per ground squirrel (in which rickettsemia has been shown to last only a few days in any 1 infected animal) will offer only limited support to the idea of new lines of infection. Recovered or immune animals do not contribute to this maintenance mechanism as reported by Price (1) and Philip and Parker (unpublished paper). Although minor yearly fluctuations in numbers of ticks were observed in a quantitative study, no marked increasing or decreasing trends in the local tick population have been observed over several seasons that would alter the above considerations (2).

A third mechanism which could enhance the starting of new lines of infection in areas where susceptible rabbits and hares are more abundant involves widespread infection in the rabbit tick *Haemaphysalis leporis-palustris* (3) and in *Dermacentor parumapertus* (4). All stages of *D. andersoni* also have been found on native hares and rabbits.

A fourth mechanism which has not been adequately explored but which probably assists in natural maintenance of the disease is transmission during copulation of adult ticks on large, mostly insusceptible animals. In 1933 Philip and Parker (5) showed that infected male ticks can pass infection to ova of uninfected females with the sperm. Since male ticks remain on their hosts after engorged females have dropped off, they can and do mate with more than one female over an unknown period, but the percentage of infection in resultant

larvae has not been checked. Until this rate of infection is known, this mechanism cannot be dismissed in the consideration of factors in the maintenance of *Rickettsia rickettsii* in nature.

East Side Human Infections

From the earliest days of settlement, the west side of the Bitterroot Valley has been known as the hazardous side as regards human infection. Most cases, although not all as reported by Price (1), have been in west side residents more or less repeatedly exposed to local ticks or in persons visiting the west side just prior to their illnesses. Very infrequently an east side resident has become ill without obvious west side contacts. Credulity is occasionally strained to reason that the offending tick was brought back from the west side by other members of a patient's household or by a crew of east side laborers who had made a west side visit. Nor is it likely that adult ticks, after once having attached to stock animals brought from the west side, would transfer to persons.

Between 1930 and 1938, there were at least six such "east side" cases. Two of these were in timber workers who contracted Rocky Mountain spotted fever in the lower east side hills in different areas and years. One died; the other, who recovered, had been vaccinated in previous years. A third case was in a 6-year-old girl living on an east side ranch. She had taken a trip to the lower east side hills the week before onset of the disease, which she survived. A tick was found in her scalp. The fourth, a housewife, 33 years, on a ranch 7 miles

Table 1. Average number of immature *Dermacentor andersoni* per small native animal from two sides of Bitterroot Valley, 1930-32

Animal	1930		1931		1932		Average		Average number per animal	Total number animals examined
	West	East	West	East	West	East	West	East		
Columbian ground squirrels.....	4. 28	22. 1	4. 07	5. 58	5. 0	5. 77	4. 45	11. 15	6. 37	954
Golden-mantled ground squirrels....	14. 43	(¹)	9. 2	(¹)	13. 25	(¹)	12. 29	(¹)	13. 2	48
Chipmunks.....	3. 2	1. 38	. 93	. 89	1. 96	3. 8	2. 03	2. 02	2. 0	430
Woodchucks.....	6. 1	2. 81	7. 0	7. 85	3. 66	. 55	5. 55	3. 55	5. 2	63
Snowshoe hares.....	0	7. 5	8. 3	(²)	1. 0	(²)	3. 1	2. 7	2. 2	33

¹ No golden-mantled ground squirrels on east side of valley.

² Hares not available on east side 1931-32.

east of Stevensville, found a tick on her thigh prior to characteristic severe illness from which she recovered. None of the four persons had himself been to the west side within a reasonable time, but circumstances did not eliminate possible indirect west side contacts of the unlikely nature described previously.

The circumstances in the other two cases appeared to remove any reasonable suspicion that west side ticks could have been concerned. One patient was an employee (G. B., 45 years) working on an east side ranch 1 mile east of Victor; the other (J. H., 67 years) was the owner of a ranch known to be tick infested 1½ miles east of Corvallis. Careful questioning found no evidence of visits or movement of stock and wood from the west side within a reasonable period. Neither person had been vaccinated against Rocky Mountain spotted fever. Both had histories of tick bite, with typical rash and fever, and both recovered.

A strain of spotted fever isolated from J. H. was of moderate virulence for guinea pigs through nine successive passages.

Recovery of a symptom-producing strain in guinea pigs from east side *D. andersoni* substantiates that cases can occur in that area. During one series of tests of adult ticks from Harlan Gulch southeast of Hamilton, 1 of 27 guinea pigs, each injected with 2 ticks partially laboratory fed and incubated, developed a fever on the fifth day and died on the ninth. Transfer of tissue from this guinea pig provided a fever-producing strain which was maintained for 27 passages, and its identity with other virulent strains was confirmed.

Nevertheless, the observation remains essentially true and still unexplained that a high proportion of Bitterroot Valley cases have originated from bites of west side ticks, although many people have been bitten by east side ticks.

Rapid Tick Passage

Strains of Rocky Mountain spotted fever have frequently been carried in the laboratory through continuous animal passages for many generations, but this has not previously been done with alternating cycles in ticks. A strain fully virulent for guinea pigs, which had been isolated from a western Montana patient in

May 1946, was selected for this study of the effect on virulence of rapid tick passage. This strain had never been passed in chick embryos but had been through 38 continuous passages in guinea pigs and then stored in the frozen state (dry ice at -70°C.) for 4 years.

In 1955 a series of alternating tick-guinea pig-tick passages was initiated by the simultaneous feeding of infected adult ticks and non-infected nymphs on hosts. Elimination of transovarial passage shortened the intervals needed for tick development in a given passage. In this manner it was possible to compress 13 animal passages due to 12 tick generations, held at room temperatures in humidity jars, into the unexpectedly short period of 25 months. Based on past experience with laboratory strains of differing virulence, the reactions and fatality rates in test animals were used to provide comparisons of virulence in tissue- and tick-infected guinea pigs. These criteria were also used by Price (1).

The uncomplicated histories of 27 guinea pigs infected within the first year after isolation and before freezer storage of the strain are available for comparison with 25 each infected afterward by spleen suspension and citrated blood. The first group of 27 had a mean incubation period of 3.52 days, and 59 percent died. For the second group, the mean incubation periods following spleen and blood injection were 2.76 and 3.32 days, respectively, and 44 and 56 percent died (table 2).

For comparison with these are the clinical records of 24 and 29 guinea pigs bitten by 1 pair each of infected ticks of the 10th and 13th generations. The mean days of incubation were 6.6 and 4.8 respectively, and the fatality rates were 62 and 83 percent. It is probable that most, if not all, of tick-bitten animals were infected by the bites of single females which had been applied 3 days before introduction of males to stimulate rapid and complete engorgement.

The spread in the mean incubation periods between the tissue-transfer and tick-bitten groups is surprisingly low when the more massive inoculums of the former are considered. Fatality after tick bite is actually a little higher. It is remarkable that 16 of 29 animals exposed to the 13th generation of ticks had in-

Table 2. Comparison of animal tissues with tick bites as sources of infection of Rocky Mountain spotted fever in guinea pigs

Test group	Number of guinea pigs	Mean days of incubation	Extremes, days of incubation		Mean days of fever	Number recovered	Percent mortality	Mean day of death	Extremes, day of death		Number of guinea pigs showing—	
			Minimum	Maximum					Minimum	Maximum	Serotal swelling	Sloughing
Before storage: Blood virus-----	27	3.52	2	5	(1)	11	59	13.87	9	19	26	25
After storage:												
Blood virus-----	25	3.32	2	6	7.6	11	56	11.69	9	18	23	11
Spleen suspension-----	25	2.76	2	5	7.6	14	44	10.04	8	14	24	11
Tick feeding:												
10th generation ² -----	24	6.61	4	11	5.5	9	63	16.82	10	32	14	7
13th generation ² -----	29	4.89	2	11	7.1	5	83	13.33	9	24	27	15
Routine feeding ³ -----	19	4.57	3	7	6.0	5	74	11.92	9	16	16	3

¹ Not calculated because too many animals were sacrificed for strain passage.

² Single unfed female ticks of each "generation" attached to each animal for a minimum of 3 days before a male is introduced into each capsule to promote rapid feeding.

³ Multiple tick feeding during 13 passages.

cubation periods as short as 2 to 4 days which could only have followed bites of single, unrefrigerated female ticks.

A comparison of various clinical features following various routes of infection is provided in table 2. No significant change was detectable after 13 generations of rapid tick passage, and the virulence of the strain for guinea pigs appeared to be fully maintained. It also appears that the virulence of the strain after 4 years' storage in the frozen state had not been markedly altered.

Tick Feces as a Source of Infection

Tick feces are considered a source of human infection with *Pasteurella tularensis* in tularemia (6) and with *Coxiella burnetii* in Q fever (7, 8), just as louse feces are a source of epidemic typhus. Experimental evidence indicates that infection with spotted fever among animal handlers is much less likely to occur through a similar agency.

Female *D. andersoni* ticks, during engorgement, customarily show a sequence of defecation of dry pellets for several days, then a rather viscous mass of altered blood, followed terminally by whitish plaques apparently of excretion from malpighian ducts.

Freshly excreted fecal pellets, masses, and plaques were collected at intervals from single,

female ticks while feeding on 12 different guinea pigs; each animal became infected as a result of tick bite and died of spotted fever. Collected feces were macerated on the moistened, intact or abraded skins of 68 test animals in 3 series of tests without producing infection. All animals were proved to be susceptible. Fecal suspensions in physiological saline from only two of the four ticks in one series caused infection when injected intraperitoneally into other guinea pigs at least 5 to 9 days after attachment, prior to which early feces from even these two ticks were noninfectious by injection (table 3).

Attempts To Infect Fleas and Mosquitoes

The tropical rat flea *Xenopsylla cheopis* is the well-known vector of the endemic typhus agent, *Rickettsia typhi*. It was of interest to test adaptability of *R. rickettsii* of spotted fever to this flea or to indigenous rodent fleas in order to investigate the possibility that they might play a secondary role in natural maintenance. Dr. William L. Jellison of the Rocky Mountain Laboratory assisted in some of these earlier studies.

X. cheopis fleas were fed for 6 days during pyrexia in a fatally infected guinea pig. Transmission was not effected by injection of 6 freshly fed fleas, by transfer of 28 fleas to a

capsule on a new animal where they were observed feeding on the 8th and 12th days, or by injection of 1 living and 5 recently dead fleas from this animal after 21 days into another guinea pig.

Similar tests with the common woodchuck flea, *Thrassius acamantis*, gave negative results in 2 series of tests by injections of 1 to 13 fleas after various intervals, by immediate transfer, during interrupted feeding, of 13 fleas between a donor with fever and scrotal lesions and a new animal; and by transfer of other fleas to a new host after several days on the donor. At least three fleas remained active for as long as 9 days on the second host, and a suspension of these was noninfectious when injected into a third.

Tests of transmission by four lots of the rabbit flea, *Cediopsylla inaequalis*, also proved negative. Two lots of fleas were fed on infected domestic rabbits with fever and orchitis for 6 and 10 days, and allowed to transfer from sacrificed donors to fresh rabbits. After 13 days on the new hosts, one flea from each failed to infect additional rabbits by bite, or guinea pigs after injection. Fleas of the other two

lots were permitted in a similar manner to transfer from laboratory-infected, native cottontail donors to domestic rabbits without causing infection. Injections of fleas from both donor and test rabbits into guinea pigs up to 37 days were noninfectious. Tissues of both donor cottontails produced disease when injected into guinea pigs at time of transfer of fleas.

Mosquitoes have been observed feeding on hares in nature (9) and will undoubtedly accept opportunities to attack rodents as well. However, three lots of *Aedes aegypti* failed to become infected when fed on infected donor guinea pigs, according to tests by bites and injection during 14 days' storage at room temperature.

It is apparent that neither fleas nor mosquitoes, at least under conditions of these tests, are likely vectors of Rocky Mountain spotted fever rickettsiae in nature.

Summary and Conclusions

Mechanisms of natural maintenance of spotted fever rickettsiae are reviewed in the light of new information and with relation to the fauna

Table 3. Sample results of tests with tick feces during separate engorgement of two female *Dermacentor andersoni*

Experiment and test guinea pig number	Day of test	Test dose of feces ¹	Route of infection	Outcome of test guinea pigs	
				Original exposure	Challenge RMsf
III, donor a: ²					
1.....	5	3 pellets.....	{ Abraded.....	No reaction.....	Susceptible.
2.....	5		{ Clipped.....	No reaction.....	Susceptible.
3.....	5		{ Injected.....	No reaction.....	Susceptible.
4.....	8	10 pellets.....	{ Abraded.....	No reaction.....	Susceptible.
5.....	8		{ Clipped.....	No reaction.....	Susceptible.
6.....	8		{ Injected.....	RMsf (died).....	
7.....	9	12 hemolyzed pellets.....	{ Abraded.....	No reaction.....	Susceptible.
8.....	9		{ Clipped.....	No reaction.....	Susceptible.
9.....	9		{ Injected.....	RMsf (died).....	
III, donor d: ³					
10.....	3	14 pellets.....	{ Abraded.....	No reaction.....	Susceptible.
11.....	3		{ Clipped.....	Pneumonia.....	Invalidated.
12.....	3		{ Injected.....	No reaction.....	Susceptible.
13.....	5	20 pellets.....	{ Abraded.....	No reaction.....	Susceptible.
14.....	5		{ Clipped.....	No reaction.....	Susceptible.
15.....	5		{ Injected.....	RMsf (died).....	
16.....	6	Hemolyzed mass.....	{ Abraded.....	No reaction.....	Susceptible.
17.....	6		{ Clipped.....	No reaction.....	Susceptible.
18.....	6		{ Injected.....	RMsf (recovered).....	Immune.

¹ 1 hour's fresh deposit from each tick used in aliquot portions for transfer on each day. ² Donor guinea pig had 6 days of incubation, 2 days of fever, and died on the 10th day. ³ Donor guinea pig had 4 days of incubation, 6 days of fever, died on the 12th day.

of the Bitterroot Valley of Montana. Contrary to some reports, evidence is presented for the possible exceptional contraction of human infection and the occasional occurrence of relatively virulent strains on the east side of the valley. Although data continue to support accumulated observations that virulent spotted fever is mainly prevalent on the west side, an adequate explanation, ecological or otherwise, for this difference is still not apparent.

To check any possible effect on virulence, a strain of Rocky Mountain spotted fever was used to infect guinea pigs in 13 rapid passages through bites of 12 alternate generations of *Dermacentor andersoni* compressed into a period of 25 months. Uninfected, immature ticks were fed simultaneously with infected adults during each fresh guinea passage to establish each new generation. The infection rate in test animals was as effective following paired tick feedings as in using direct blood or spleen transfers. There appeared to be little significant change in virulence after 13 alternating tick passages, as judged by comparison of clinical data. However, the fatality rate was a little higher following tick feeding than after tissue passage.

Feces of ectoparasites are not as potential a source of infection in spotted fever as they are in certain other tickborne diseases, such as Q fever and tularemia, or as in louseborne typhus fever. Neither fleas of three different species nor aedine mosquitoes appeared to be adaptable to an incidental role in natural maintenance of the agent, though important rodent hosts carry over an average period many more fleas than ticks and are probably frequently bitten by indigenous mosquitoes.

It is possible that some of these observations will apply to Siberian tick typhus also. Not only is the ecology of that disease more similar to spotted fever than to tickborne fièvre boutonneuse and related diseases in Europe, Africa, and India, but comparative etiological studies in progress substantiate this difference in relationships.

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DOCUMENTATION NOTE

An additional table covering total numbers of larval and nymphal *Dermacentor andersoni* taken on small native animals through three seasons on two sides of the Bitterroot Valley has been deposited as document No. 5916 with the American Documentation Institute Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A photoprint copy may be obtained by remitting \$1.25; a 35-mm. microfilm copy by remitting \$1.25. Cite document number. Advance payment is required. Make checks or money orders payable to Chief, Photoduplication Service, Library of Congress.

The Public Health Nurse As Coordinator in a Geriatric Clinic

ESTELLE T. MALACHOWSKI, P.H.N.

THE GOAL of the geriatric clinic of the San Francisco Regional Office of the Veterans Administration is to help the patient and prevent the necessity of hospitalization or institutional care as long as possible.

The clinic's patients are veterans of the Spanish-American War. Under Public Law 791, 81st Congress, they are eligible to receive medical supervision and appropriate coordinated services. These men, whose median age is 79 years, challenge the clinic to give them more years to live. Confronting geriatrics in the future are the veterans of World War I, whose median age is 66 years. This group does not have the blanket type of outpatient medical care plan provided for the older veterans.

The clinic, opened in 1952, was the first of its kind in the Veterans Administration. The pilot study report, "Coordinated Approach to Geriatrics," is also the first recorded attempt to demonstrate a team approach to geriatrics in a regional office of the Veterans Administration (1). The clinic provides facilities and therapeutic accommodations in medicine, public health nursing, physical therapy, nutrition, social service, and psychiatry. Its personnel collaborate with staff specialists, consultants of the regional office, and regular visiting consultants from the local medical society, and with community agencies to give the veteran the care he requires.

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The complications of illnesses, disabilities, and personal and social difficulties of the Spanish-American War veteran are often multiple. To help him with these, the geriatric clinic has a team of specialists consisting of the chief of the clinic, public health nurse, social service worker, physical therapist, psychiatric consultant, and medical secretary.

Clinic sessions are held each Tuesday from 9 to 11:30 a.m. The physical setting includes a clinic room used for other clinics at other times, a waiting room which seats 10 patients, the office of the public health nurse, an emergency bedroom, a surgical unit, and a central supply unit.

Prior to his initial visit to the clinic, the patient has been given a complete physical examination by the staff geriatric consultant, and medical and laboratory records are ready for review. At the clinic the new patient is first interviewed by the public health nurse, whose previous hospital experience and education in public health have prepared her to act as counselor to the patient and coordinator of the clinic's services.

She takes the patient's blood pressure, pulse, and weight, recording them as well as other pertinent information that will be valuable to the geriatric team. But perhaps her most important job in this 20-minute interview is to communicate the clinic's approach to the patient and determine his attitude toward accepting treatment and instruction.

She may notice that the patient is neatly dressed and well groomed, that he appreciates

a comment on his appearance, that he exhibits some stiffness of joints as he seats himself, and that he wears glasses and dentures. But she is also aware that he is a person, with varying physical and mental abilities, needs, feelings, attitudes, and capacities.

Past experience has taught the nurse that one of a patient's foremost fears is "what the doctors found or what laboratory findings revealed." Her own behavior in this conversation may either intensify those fears and anxiety or stimulate revelations which may prove pertinent.

Many interviews have taught her that older people love to talk about their experiences and sometimes it is difficult to focus their attention on a question long enough to get a direct answer. Often, patience and tact are necessary to recall the patient to the original question, although permitting the patient to ventilate his emotions has a therapeutic value.

The nurse's goal in the first interview is to present to the clinic team a profile of the patient's immediate medical problems and his economic, social, and cultural background, and to explain to the patient the various services of the clinic and the regional office. On the patient's first visit she will merely outline these services. At subsequent interviews and referrals to other medical and nursing services, she will devote more time to clarifying the scope of services, utilizing visual aids and emphasizing health measures. After the interview the patient is escorted to the waiting room to be called later to the clinic room.

The nurse then joins the team in the clinic room and listens to the medical review of the patient presented by the staff geriatric consultant, the chief of the clinic. The anecdotal record of the nurse-patient interview is also read. After evaluation of both reports, the patient is escorted into the clinic room and introduced to the staff. The chief of the clinic explains the team approach to the patient and its significance to his health and welfare. The patient is then given a future appointment for medical supervision, and arrangements are mapped out for the integrated services of the team according to the chief of clinic's recommendations. Clinic visits are usually 4 to 5

weeks apart. Approximately 10-12 patients attend each weekly session of the clinic.

The nurse has a short conference with the patient after he has left the clinic room to ascertain his reaction to this type of medical care and to be sure he understands the medical orders. Occasionally she finds he has already been prepared for the clinic by his friends in the waiting room or has heard about it from his comrades in the Spanish-American War veterans organization. A majority of those veterans hold office or attend meetings of the various camp units along the California coast.

The nursing assistants of the regional office are unofficial members of the geriatric team, but they assist in many ways. The male nursing assistant, under medical and nursing supervision, gives direct service to the patient in minor surgery, genitourinary treatment, proctoscopic examinations, and orthopedic steroid therapy. He prepares the patient and the instruments for these treatments, and, before a physical examination, helps a patient who may have difficulty in undressing. The nursing assistants help not only in the geriatric clinic but in other specialized clinics and in the general medicine practiced in the regional office.

Services Within the Regional Office

As counselor and coordinator, the nurse explains the medical program of the regional office and other services of the Veterans Administration to the patient during subsequent visits. The patient may have been referred by the chief of the clinic to have his eyes examined, his hearing tested, or his dentures examined. The nurse is aware of the importance of prosthetics and sensory aids to these patients. For example, when she noticed a significant drop in the weight of one patient, he confided to her that his dentures were loose, and he only wore them during his clinic visit. He had been eating baby food for the past few months. This information was brought to the attention of the clinic physician who referred the patient to the dental clinic.

The mental hygiene unit of the regional office provides a psychiatrist who conducts group therapy for the geriatric clinic patients. A social worker acts as co-leader. The patients

meet informally with the psychiatrist before the clinic sessions begin.

Responses to the group therapy vary. The patients are remarkably self-reliant and reticent in discussing their difficulties before a group. Usually the discussions center around the trials inherent in caring for their aging wives or about their difficulties in adjusting to being a secondary member of someone else's household. When they talk about themselves, they are surprised and relieved to realize they have so much in common with others.

Many surgical services are available to the patients of the geriatric clinic, and surgery can be scheduled at the mutual convenience of patient and surgeon. The surgeon on the staff is qualified in general, plastic, hand, genitourinary, proctological, and orthopedic fields. In general, hand, and plastic surgery, biopsy and diagnostic procedures can be performed. Diagnostic proctological procedures such as sigmoidoscopy, biopsy, treatment of thrombosis, and external anal afflictions, and genitourinary procedures such as care and followup of external urinary fistulae, soundings, and stricture dilations are done in the surgical clinic. In orthopedics, controlled steroid injection therapy is administered to multiple joints.

Since discontinuance of the nutrition service in 1955, the clinic nurse has assumed the responsibility, with the cooperation of the chief of the clinic, of reevaluating diets at appropriate intervals. Each diet is modified to conform to changing medical requirements and to the patient's tolerance for certain foods.

Other services are available to the patient in such special fields as allergy, dermatology, arthritis, urology, tuberculosis, diabetes, orthopedics, prosthetics, and sensory aids. Special needs are determined by the chief of the clinic and appropriate referrals are made.

Extramural Services

The hometown medical care program of the Veterans Administration is the extramural service for patients of the geriatric clinic and for eligible veterans of the two World Wars and the Korean conflict who are unable to travel to the regional office or who may require emergency care. In fiscal year 1956, more than 554,000 VA patients received hometown medical

care at a cost of \$6,290,133. Of this amount, \$699,735 was spent to care for 62,769 veterans of the Spanish-American War (2).

All geriatric clinic patients, and especially those with a history of heart disease, are informed about the hometown medical care program. The nurse explains the communication necessary between the physician in the patient's community and the authorization officer in the regional office. The patient is also reminded to make his immediate family aware of the program so that they can act in an emergency. The assurance that medical services can be provided in their homes is important to these patients. As they grow older, their homes are more important to them and severance of ties with them are often traumatic.

In an emergency, communication between the authorized fee-basis physician (usually the family physician) attending the patient at home and the chief of clinic may provide the fee-basis physician with the current medical diagnosis, history of illness, and results of laboratory tests, and thus prevent expensive, repetitive tests and examinations.

Fee-basis physicians are usually selected by the patient, and in most instances are the family physician. If the patient does not have his own physician, the Veterans Administration provides him with a list of three in his community, and he selects one of these. At the present time the selection of physicians is limited to those who are members of the California Physicians Service.

Community home nursing services are an important component of the hometown medical care program. The regional office, which has contracts with various community health agencies, can arrange for home visits by members of a visiting nurse association. If there is no such agency in the area where the patient lives, visits by a registered nurse or a licensed vocational nurse can be arranged.

The clinic, the hospital, or the authorized fee-basis physician may indicate the need for home nursing services. The referral for such services, made by the chief of the clinic, may be for the purpose of administering special medication intramuscularly or for followup of prescribed treatment that has been demonstrated to the patient by the clinic nurse. If

home care is needed following a hospital stay, the ward nurse usually explains the home nursing care that is available. Final arrangements for home visits are the responsibility of the chief of the nursing unit of the regional office, who is familiar with the resources of the neighboring communities. Fee-basis physicians' requests for home nursing service go to the chief of the nursing unit of the regional office.

The following case report illustrates the importance of continuity of medical and nursing care in the home.

Mr. W., 83 years of age, had been attending the geriatric clinic for about 5 years. In November 1956 he complained of chest pains and a "loose cough." His established diagnosis was arteriosclerosis and hypertension. An X-ray revealed a mass in the right side of his chest. He was referred to the nearest Veterans Administration hospital for further studies, and the final diagnosis was pulmonary metastasis, primary, undetermined. The hospital physician explained to Mr. W.'s wife and daughter that further treatment was impossible because of the patient's age and the possible complications.

After Mr. W. was discharged from the hospital, the family physician requested weekly home nursing visits for general bedside care, intramuscular injections, and health guidance to the family. Mr. W.'s wife, 80 years of age, and unmarried daughter, 50, who supported the family financially and did the housekeeping as well, were eager to have supportive care.

The chief of the nursing unit contacted the visiting nurse service by telephone, and home nursing care for Mr. W. was started within an hour. The visiting nurse reported to the regional office that the wife and daughter had received her warmly. She had instructed them in maintenance therapy to prevent decubiti, joint stiffness, and loss of self-care ability and pointed out the importance of keeping medicine beyond Mr. W.'s reach, for he became confused at times.

She reported the family had missed Mr. W. when he was hospitalized, were happy to have him at home, and felt they could care for him with a little help from her. Mr. W. stated he would soon recover since he was at home. The visiting nurse association submits a monthly

bill of \$16, and the fee-basis physician's home services cost \$24 a month. Each visits Mr. W. four times a month.

This case demonstrates the teamwork of the hospital, family, fee-basis physician, the community service agency, and the staff of the regional office in the extramural medical treatment program of the Veterans Administration. The visiting nurse is in close contact not only with the attending physician but with the chief of nursing unit in the regional office. Medical orders, prescribed treatment, health instruction to the family, evaluation visits, determination of the number of visits, and environmental factors are discussed with the chief of the nursing unit at intervals.

From the patient's standpoint, the success of the home nursing care is measured by the satisfaction he derives from it. About one-fourth of the cases on record in the regional office are those of Spanish-American War veterans. Periodic telephone calls to patients have assured the office that they are satisfied with the home nursing service.

Dr. E. M. Bluestone has said that when we permit a patient who has reached the terminal stages of his illness, and who still enjoys illusions of hope, to be maintained in familiar surroundings where he can be cared for by himself and his family, we are moving in the right direction in extramural service (3).

In fiscal year 1954, 932 patients throughout the VA received home nursing care at a total cost of \$88,001.82. The average cost per visit was \$2.58, which was considerably below that required to maintain a patient in a general medical and surgical hospital during that fiscal year. Average hospital cost for this period was \$19.84 per day (4).

The number of patients who receive community nursing service has increased since the program was organized. According to a report in *Nursing Outlook* (5), "The monetary value of home nursing services cannot be estimated in terms of the individual veteran's and the community's health and happiness. The average fee per visit was \$2.67 in 1955, which is an increase of 9 cents over the 1954 and 18 cents over the 1952 cost per visit. The Government paid a total of \$96,251 to contracting public health agencies in the fiscal year 1955 for

their services under the community nursing program. This was an increase of \$8,251 over the 1954 cost to the Government and is evidence of the increased use of the home nursing service. But this represents an important reduction in the cost to taxpayers when compared with the cost of the hospital care that would be required."

Volunteer Service

The San Francisco regional office has an active volunteer service of 35 members who represent various organizations. Two volunteers are from the auxiliary unit of the United Spanish War Veterans. The geriatric clinic patients know them both as widows of men who have been active in camp affairs. They package gauze abdominal pads, applicators, and other requested materials, meeting a quota of 3,000 packages a month which are sent to eligible veterans.

They assist in other ways. For example, recently the colonel, a 94-year-old veteran who lives alone in a single room, seemed to be getting weaker by the day and was confused at times. He had an ambivalent feeling about going to the California State veterans home and had twice canceled plans to go there. Each afternoon for 3 weeks he hobbled eight blocks to the regional office and reported to the emergency bedroom to rest and eat the milk and crackers the volunteers served him.

Concerned about him, one of the volunteers contacted his friends in the camp and explained the colonel's predicament. When the camp members visited him, he said he wanted to go to the veterans home, but was worried about his thousand pounds of baggage. The members assured him they would take care of his belongings. Although the physician, nurse, and social worker had tried before to arrange domiciliary care, the colonel was not ready to move until the camp members, alerted by the volunteer, took action.

Two of the volunteers are men. One has charge of the storage and distribution of various health pamphlets to racks throughout the building. The other, a retired pharmacist, gives his time in the pharmacy packaging stock medicines which are sent by mail to veterans whose physicians have requested the medicine.

The regional office has found that volunteer duty is a useful form of rehabilitation in geriatrics and should be encouraged. Assigning a volunteer a definite responsibility and making sure he knows that others are depending on him gives him satisfaction in his work.

Conclusions

The experiences of the public health nurse in the geriatric clinic have been rewarding. She uses skills in health education, teaching, interpreting physicians' orders, and planning with the patient.

She understands that the patient of advanced age has many needs. Indirectly she has shared many of the problems of these patients and has tried to give them guidance. She has learned that they wish to remain independent and assume responsibilities, despite physical and social stresses.

She has learned how these veterans acquire hobbies to compensate for lonely hours, and how they fulfill social needs in the camps of the Spanish-American veterans' organization.

The clinic provides an insight into the geriatrics of the future. The Spanish-American War veteran has challenged the clinic to give him more years to live. The World War I veteran, on the periphery of geriatrics, presents a similar challenge.

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Epidemiological Notes

Plastic Film Hazard

Filmy plastic bags, used by dry cleaners and food packagers, were brought to public attention as a household hazard when Dr. James F. Benedict of Erie County, N.Y., was quoted in the *New York Times*, August 29, 1958. He referred to two infants suffocated by such wrappers.

At the October 1958 meeting of the National Safety Council, a delegate issued a warning and mentioned an accidental suffocation said to have been caused by a plastic bag. Four more deaths were cited by Dr. Paul B. Jarrett, chairman of the Maricopa County Medical Society Accident Prevention Committee, in the *Arizona Republic* of January 4, 1959. All of these were infant deaths occurring in the vicinity of Phoenix. Later in January, Dr. A. B. Rosenfield of the Minnesota Department of Health reported to the press that two infants had been suffocated by makeshift pillow covers made from plastic bags.

The use of the bags as covering for bedding appears to have been a contributing factor in many of these infant suffocations. In other cases, babies have managed to grasp plastic bags lying nearby. Suffocation occurs when the limp film clings to the mouth and nostrils. Even toddlers, playing with this thin plastic, have become enmeshed in it and suffocated themselves. The increase in such deaths corresponds with the rise in sales of thin plastic bags. The dry cleaning industry alone bought 600 million in 1958 but almost none in 1955.

In early February 1959, a letter directing attention to the Arizona report was circulated in the medical and health field by Dr. B. H. Conley, secretary of the Commission on Toxicology, American Medical Association. On February 26, the Public Health Service began investigation by requesting its regional offices to seek further information on incidents of this nature through State health departments.

During March, April, and May, reports of more accidental suffocations appeared in quick succession. Additional cautionary statements were issued by health agencies, officials of local medical societies, the National Institute of Dry Cleaning, and the Society of the Plastics Industry. Following the suffocation of a 10-week-old infant in Windsor, Ontario, the Canadian Press reported May 24 to the *New York Times* that the dry cleaning concern affected is abandoning the use of plastic wrappers.

A telegraphic survey of State health officers by the National Safety Council on April 20 brought to light at least 20 accidental suffocations since January 1, 1959, which were reported on the death certificates as due to some sort of plastic film. By the end of May the list of such tragedies had grown to 35 for 1959, according to information received by the Accident Prevention Branch of the Public Health Service. At that time, the known count for 1958 and 1959 was 55 accidental suffocations and 3 suicides reported to have involved plastic film.

The Public Health Service began epidemiological investigation of deaths reported from this cause early in May with the cooperation of State and local health departments. Results of intensive study of seven of these deaths have convinced Service officials of the need for public education to prevent future tragedies of this kind. A cautionary leaflet, "Plastic Film—Correct Use and Mis-use," prepared in cooperation with public and professional organizations by the Society of the Plastics Industry, is available without charge for distribution through public health agencies.

Despite the apparent involvement of plastic film, it is not clear that mechanical suffocation was the true cause of death in all the instances mentioned for 1958 and 1959. A wholly accurate measure of the death toll from plastic film would have been possible at this time only if all infants who died in circumstances suggesting suffocation from it had been examined postmortem by pathologists. In the past, studies of sudden deaths of infants have demonstrated that a significant proportion of those believed due to mechanical suffocation may have resulted from acute respiratory infections, such as tracheobronchitis and acute interstitial pneumonia. In view of these facts, postmortem examination of infants believed to have died from mechanical suffocation is highly desirable.

A demonstration underway in Connecticut is proving the value of voluntary consultation as a means of upgrading the standards of community hospitals.

A Project in Voluntary Consultation for Hospitals

JOHN T. FOSTER, M.P.H., and JANE HARTMAN, M.S.

IN 1955, leaders of the Connecticut Hospital Association felt that a need existed among their 33 short-term, member hospitals for guidance in dietary and personnel practices. An application was submitted to the Public Health Service requesting a grant whereby two specialists could be added to the staff of the association to provide voluntary consultation services to member hospitals.

The application stated, "There exists today a hiatus in most parts of the country between the recommendations of the experts and the actual operation in the individual hospitals. Most hospitals are small and cannot afford highly trained department heads or experts in all fields to take advantage of the many recommendations. This is particularly true in personnel and dietetics." The application further stated, "The value would be measured not only by improved personnel and dietary practices, but also through financial savings in the individual hospitals."

Mr. Foster, assistant administrator at the Stamford (Conn.) Hospital, was a student in the Yale University program in hospital administration at the time of the study. Miss Hartman serves as food service specialist in the project for improved dietary administration at the Connecticut Hospital Association. The study was supported by a Public Health Service research grant (W-7, C-2).

A 2-year grant was awarded in April 1956, and, based on initial results of the project, a 1-year extension was approved. The association is studying the possibility of financing the program on its own on a permanent basis.

Consultation services, as such, are not new. In hospital administration alone consultants flourish on a fee-for-service basis in many fields, including architecture, dietetics, fund raising, public relations, personnel, and accounting. These private consultants may have difficulty in obtaining clients. Once they have a contract in hand, however, they gain psychological advantage over the client, who is anxious to justify expense by obtaining value in return.

A similar receptivity is enjoyed by another type of consultant, the specialist working under the auspices of governmental regulatory agencies. When consultation is coupled with licensing, there is an implied sanction that would seem to give the consultant some advantage in acceptance.

Voluntary consultation, lacking both the financial involvement of the client and the sanction of licensing, is acutely dependent upon the effectiveness of the consultant and the degree of the client's need. This potential weakness of the project was recognized by the association at the outset.

A retrospective evaluation of the first 18 months of the dietary phase of the two-part

project was undertaken as an academic project by the senior author, a student in the course in hospital administration of the department of health, Yale University. The final report records notable gains in a majority of the hospitals. The achievements indicate that voluntary consultation can be effective when properly organized and conducted.

Start of the Project

As the food service specialist, the Connecticut Hospital Association selected a member of the American Dietetic Association who had been food service director with the Maryland State Department of Health. Her services began in September 1956 with a "get acquainted" visit to each of the 33 hospitals and a survey of the quality of their dietary programs.

To provide a frame of reference for the project, the sponsors selected the "checksheet for the hospital department of dietetics," devised by the American Dietetic Association. The checksheet, considered a summation of essential criteria, represented exhaustive study and research by a special committee of the association beginning in 1954.

The checksheet represented 51 items divided into 6 main categories of dietetic administration. The six areas of special interest but of varying degrees of relative importance were organization, facilities, personnel, records, management policies, and conferences.

Items related to organization were designed to evaluate the qualifications of the dietitian and the effectiveness of supervision. Sample questions were: Is there a written organization plan designating areas of authority? Is supervision designated for all working hours?

Regarding facilities, the items recorded the way the food was received, stored, prepared, cooked, and served. Dishwashing and disposal equipment and methods were judged as well as the adequacy of the size of dining areas and communication equipment.

Questions on personnel determined, for example, whether the department was subject to a labor-hour budget, whether the nonprofessional personnel assignments were evaluated periodically to assure sufficient employees, and whether there was an adequate number of stenographers and clerks so that professional staff

time was not used for these duties. The application of an employee merit-rating system was also checked.

The items on records asked about the accessibility of pertinent records and checked practices in accounts and inventory recordings. The following were representative queries: Is a record of all menus, as served, filed for a reasonable time? Are regular and modified menus checked for nutritional adequacy and patient acceptance? As an alternative to a perpetual inventory system, is an adequate inventory of another type maintained? Has the dietitian access to medical charts?

Sample questions under management policies asked the following: Are all patients on routine and modified diets visited at frequent intervals? Do you use written communications to make suggestions, to confirm oral discussions and decisions, to present reports, and as reminders?

The conference group of items measured the level of communications and cooperation among the dietetic, administrative, and medical staffs of the hospital. The following questions were representative: Does the dietitian in charge of the department of dietetics attend the administrator's conferences? Are staff conferences for the department of dietetics held periodically?

Subsequent to the Connecticut hospital study, the checksheet was expanded and refined to increase its utility as a measurement tool for dietary consultant services on a continuing basis.

The 33 hospitals were grouped by size because of the wide range in number of beds (and thereby of financial structure). The size ranged from more than 700 to fewer than 40 beds. The four categories established were class I, with 300 or more beds, 9 hospitals; class II, 200 to 300 beds, 6 hospitals; class III, 100 to 200 beds, 10 hospitals; and class IV, 99 or fewer beds, 8 hospitals.

Initial Survey Results

The initial survey in 1956 disclosed a wide range of compliance with the 51 individual items among Connecticut hospitals, from a low of 14 "right answers" for one to a high of 47 for another. The mean score was 31.9 and the median 31.

Of the 51 individual standards on the check-sheet, only 3 items were complied with by all the hospitals. All hospitals met the requirement that modified, therapeutic diets be ordered in writing by the physician, and that available funds be provided for nutritionally adequate meals.

At the same time, not one of the 33 hospitals met the ADA standard specifying that the dietitian write comments on the patient's medical chart, obviously a matter of regional medical practice of long standing. Only 24 percent of the hospitals were conducting adequate inservice training.

The class III hospitals were notably low in organization and personnel practices. But they ranked high in facilities and conferences, and ranked well in the remaining categories. These differences seem significant. One can understand relatively low ratings in staffing for the two groups of smaller hospitals, since qualified dietitians are a requirement. Few of these, one can speculate, have been able to obtain or afford dietitians. Funds alone do not explain the deficiencies in the smaller hospitals, however, as demonstrated in the relatively high standing of these groups in facilities where they exceeded the scores of the class II hospitals. The class II group was especially interesting; while ranking high with class I in staffing, it fell below norms in other areas. It should be noted here, however, that this group's deficiency in facilities was already being attacked through a number of building or remodeling programs to which they were committed in the fall of 1956.

Averages are useful as an indication of general patterns, but can hide wide variations within a group, and this is true of the arbitrary groupings that have been used. Class I and class II hospitals in particular ranged widely in their total scores on the checksheet completed by the specialist in her early visits. While two class I hospitals ranked high, with 47 of a possible 51 points, one hospital in the group ranked with the lowest with only 20 total points. A hospital in class II had the lowest total score of all 33 hospitals, a total of only 14 points of compliance.

In addition to observing checksheet phases of dietary operation, the specialist found that other dietary problems existed in enough of the

hospitals to make additional goals important. Such a problem was scheduling of the patient's meals. One criterion of hospital care applies to the minimizing of the inevitably large number of adjustments a patient must make as he enters the hospital world. The average patient might be expected to complain when he finds breakfast arriving between 6:30 and 7:00 a.m., a heavy meal arriving at 11:30 a.m., and a light "supper" arriving at 4:00 or 4:30 p.m. Schedules such as this were all too common.

Sanitation and housekeeping were covered by the checksheet, and the specialist was struck by the severity of some of the problems in this area. Several problems were architectural, but the majority were the result of attitude. Compounding the difficulties was the fact that few cities provided really close inspection by sanitarians. The overall average compliance of 48 percent with the item on regular inspection by a sanitarian seems somewhat inflated when it is recognized that once-a-year inspections were accepted as the norm by the specialist. Most would argue that regular inspection at least twice a year plus in-between "drop-ins" should be a minimum. Such standards were, however, typical of the Connecticut communities as she found them. At one large teaching hospital the specialist found a model purchasing procedure for canned foods. Purchasing was based on carefully prepared specifications, bidding was competitive, and sample cans were "cut" and evaluated for color, flavor, composition, and other criteria under carefully controlled conditions. Contrasted with this model system for assuring both quality and maximum use of the available food dollars, few hospitals were using competitive purchasing for either quality or cost control. This, therefore, became another area of concentration and subsequent service.

The checksheet covered standardized cost accounting for food only in general terms. This became still another area of effort, in which the specialist was aided by the Connecticut Hospital Association's accounting specialist throughout the study.

In summation, a wide variance in compliance with standards of the American Dietetic Association was found in Connecticut hospitals.

In general, larger hospitals ranked more favorably than the smaller hospitals, but this was not true in all cases for all criteria. Conditions were not "bad," but it was clear not only to the food service specialist but also to others associated with her that the original premise of the application had been valid. The administrator of one hospital, a member of the project committee, commented: "I was appalled to think that some of the things I have heard about could exist in our hospitals." Not all conditions were appalling, but certainly the survey confirmed the need expressed in the original application for improved dietary administration. The challenge and the opportunity to improve conditions were clear.

Consultation Methods

A consultant in a field such as dietetics can approach a client with either of two basic methods: with a "package program" for the client to accept or reject, or with an open mind for the client's interpretation of his needs and an attempt thereupon to find solutions tailored to his situation. The latter method is more passive and also meets the accepted criterion of teaching—that people learn more readily when they are participants in selecting the topic. It also places greater demands upon the consultant's adaptability and professional skills, although most consultants will tend to combine both methods in varying degrees. It was the second approach that primarily characterized the consultations provided by the dietary project.

Working both with the administrator and the dietitian of the hospital, the food service specialist made a total of 290 consultation visits. This averaged four per working week, and when travel time is included each visit took the better part of a working day.

Training conferences for the dissemination of new methods and for the sharing of solutions to problems was, from the beginning, one of the expectations of the sponsors. Five statewide meetings, one of these lasting an entire working week, and 14 regional meetings were held during the 18 months.

As the specialist became increasingly involved in the need for inservice training, in addition to conducting 15 demonstration train-

ing sessions, she prepared a series of training guides which were distributed to all member hospitals. These guides were also published in the *Modern Hospital*, May 1958.

From the outset, a written report was maintained on activities and progress. Also, a detailed narrative report summarizing each consultation visit was made part of the association's permanent file.

Further demands upon the food service specialist came not only from her professional affiliations but from a variety of State groups. Demonstrating the latent demand for guidance in this professional area, these requests were for consultations with special hospitals affiliated with the Connecticut Hospital Association, with State institutions, and with nursing homes.

Other unanticipated functions which took on increasing importance as the various hospitals gained confidence in the service offered were those of architectural consultation and equipment planning. Ambitious building programs of the hospitals created the need for the specialist's professional guidance that administrators found useful over and above the advice of architects and even of paid food service consultants. In one notable case, the dietary specialist reduced a hospital's equipment costs for a new kitchen by about \$75,000.

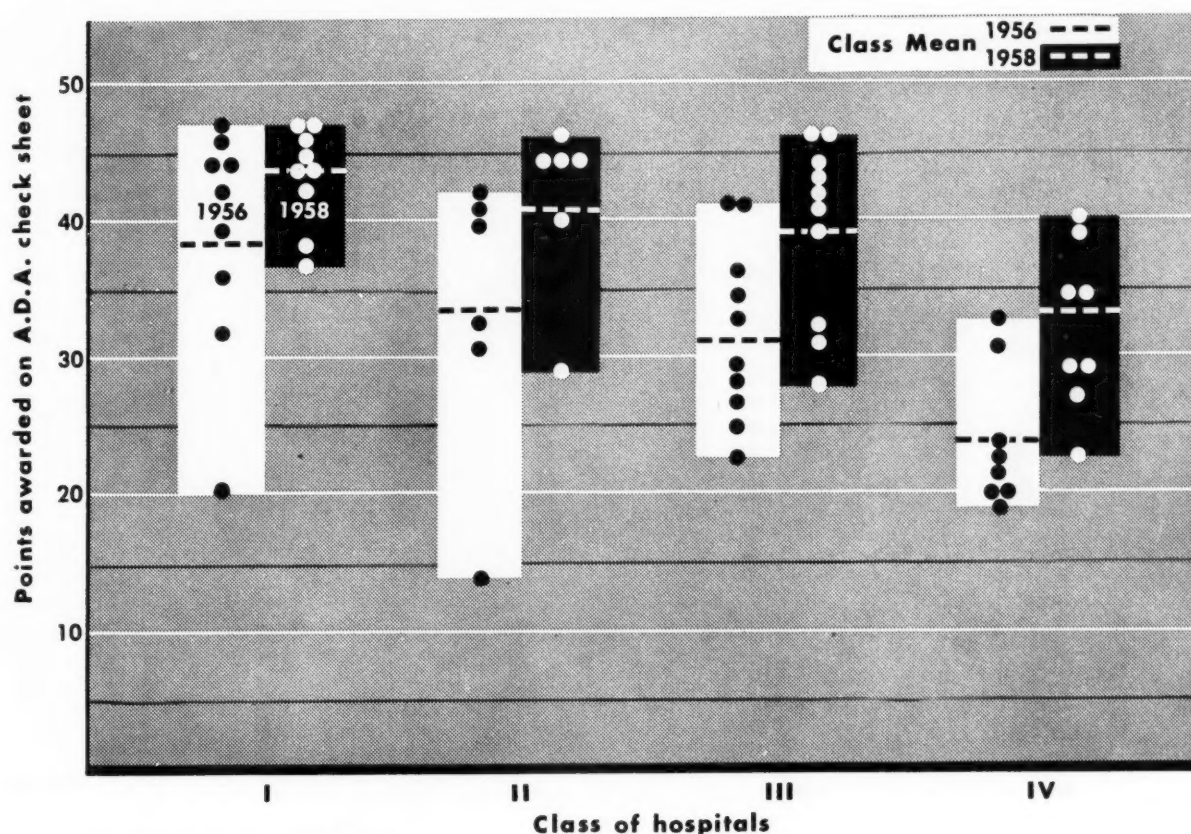
Resurvey Results

The resurvey of the hospitals at the end of the first 18 months of the dietary project showed an upward shift of standings. From an overall compliance of 62 percent in 1956, the mean for the 33 hospitals climbed to 76 percent in early 1958. Only 1 of the 33 hospitals failed to improve its score, a class I hospital with a near-perfect score of 92 percent in the first survey. The range in raw scores which had covered 65 percent of the scale in 1956 decreased to 46 percent in 1958 (fig. 1).

The mean scores of the hospital classes increased from 38.8 to 43.3 in class I; from 33.2 to 41.2 in class II; from 31.7 to 39.2 in class III; and from 23.5 to 32.1 in class IV. As expected by the sponsors, the largest proportional gains occurred among the smaller hospitals.

Gains were also made in each of the special areas in every hospital class.

Figure 1. Comparison of raw scores¹ in initial survey (1956) and in followup survey (March 1958) made by 33 member hospitals of the Connecticut Hospital Association.



¹ Ratings by dietary specialist.

A major item under staffing is the requirement that the hospital dietary department be headed by a qualified dietitian. The fact that this was unchanged quantitatively during the study period (15 of the 33 hospitals met the requirement) does not reflect the extent to which the dietary consultant helped recruit dietary personnel. Three qualified dietitians were recruited to replace head dietitians who resigned during the period, and 12 subordinate dietary supervisors were found. Other improvements in the category of organization brought the score for this area from 49 to 65 percent despite the lack of change in the one requirement.

Gains noted in the other areas were facilities, 62 to 84 percent; personnel, 52 to 71 percent; records, 70 to 81 percent; management, 65 to 73 percent; and conferences, 62 to 69 percent.

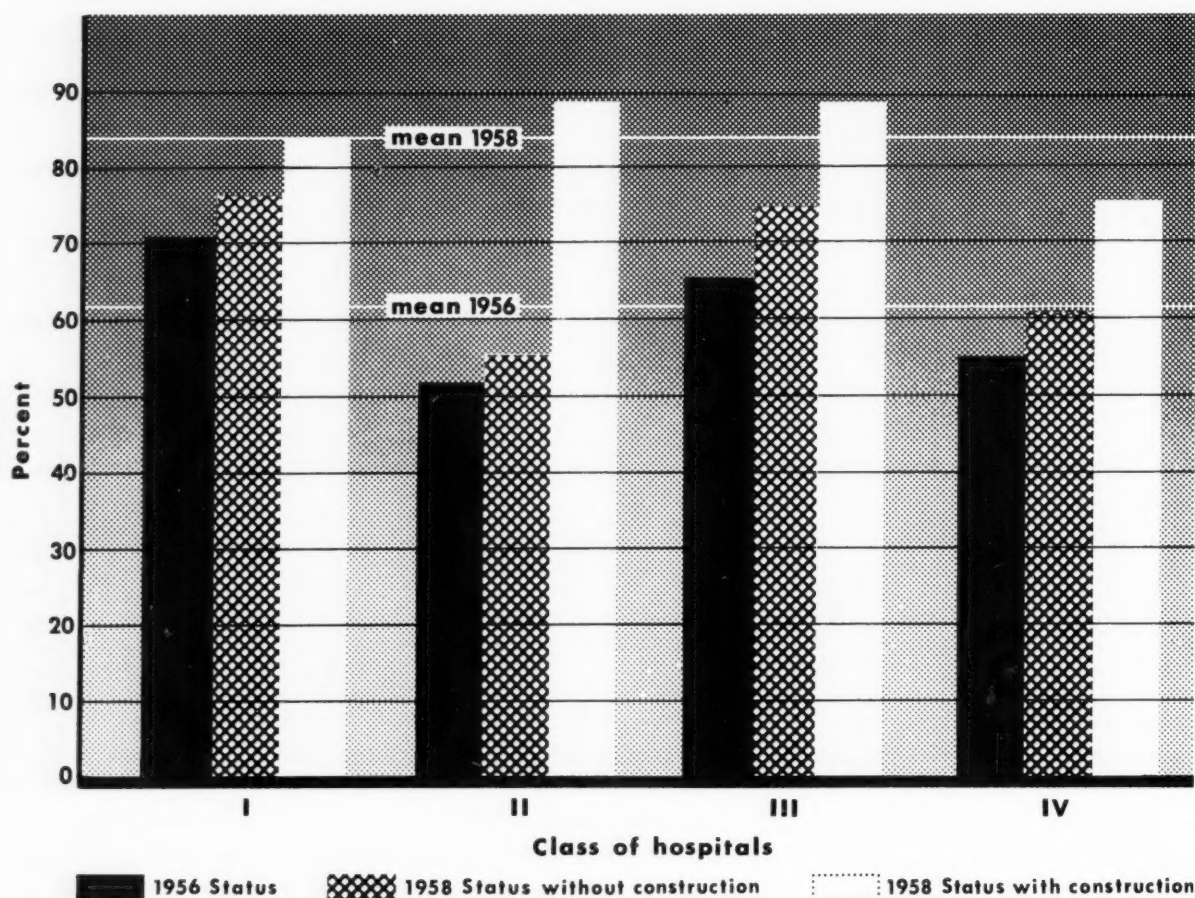
Several hospitals at the end of the report period had greatly improved the scheduling of meals for patients so that there is no more

than 14 hours between the serving of the evening meal and breakfast. Notable throughout the State were the generally higher levels of housekeeping and sanitation. These resulted from the direct consultations and inspections by the specialist, and particularly from the in-service training programs which were developed by many of the hospitals based on the training outlines the specialist had prepared and published.

In cooperation with the hospital association's accounting specialist, a monthly food cost analysis report was developed. By the end of the report period the majority of larger hospitals in the State were submitting these reports. The reporting required standardization of food cost accounting practices in these hospitals, which in turn reflected the increasing awareness of the importance of controlling food cost.

In one hospital, the specialist found that al-

Figure 2. Comparison of percentage compliance by hospital classes with checksheet standards for facilities for 1956 and for March 1958.



though the dietary department maintained high food standards, the actual responsibility for preparing and serving breakfast rested with the housekeeping department, which served the noon and evening trays prepared by the dietary department. After a man-hours study, this hospital was able to revise the entire system, so that the full responsibility rested with the dietary department, at no increased cost in personnel. It is generally accepted that there is a particular advantage in placing full responsibility on the dietary department for the condition of the food as it reaches the patient. Similar special studies were conducted in other hospitals, to the same end, and in addition in-service training and regional educational programs all helped instill in the dietary personnel increased awareness of the importance of not only preparing the food well, but of serving it attractively.

Although direct cause and effect relationships between the dietary project and these improvements cannot be proved, the consistency of the changes suggests more than circumstantial evidence of the program's value. Other influences cannot be denied. All hospital administrators are subject to constant pressure to improve services. Certainly, a constant barrage of ideas in all aspects of hospital administration is presented by a variety of publications and professional associations. Many of these influences had existed long before the dietary project but did not obtain wide acceptance in the area until this individual consultation service program began.

In one specific area, however, a clear bias in the results is evident. This was in the improvement of facilities. The largest gains were noted here. It is necessary to recognize the effect of hospital construction projects which

were, in 1956-57, at a peak in Connecticut as the result of the Hill-Burton program and, to a lesser extent, the hospital grants of the Ford Foundation. Eight of the 33 hospitals were already committed to major reconstruction or expansion at the outset of the dietary project.

In an effort to arrive at a more direct relationship between the dietary project and improved facilities, figure 2 shows three values: the 1956 compliance with facilities criteria, the gross compliance in the 1958 survey, and a "without construction" score for 1958 from which the more obvious effects of capital improvement have been deleted. While smaller, the gains again occur consistently in each hospital class.

Acceptance of the Specialist

Fully aware of the need to establish acceptance, the specialist made clear to each administrator that her services were available. There was wide variation in the response.

At the various educational conferences, a total of 546 persons attended. They included 90 administrators in addition to the dietary personnel. All hospitals were represented in at least one of these meetings and 80 percent of class I hospitals participated in the statewide meetings. The larger hospitals, however, were represented by more people than the smaller at these conferences. The smaller hospitals, on the other hand, were less apt to have professional dietitians and proved therefore to be the most responsive to professional guidance. The hospitals with building programs made the greatest demand for equipment and layout advice.

The relationship between the specialist and the administrators reflected a wide range of attitudes on the part of the administrators. There were those who were unwilling to acknowledge any problems, those who requested advice but were unable to apply it, and still others who were receptive to advice and effective in putting guidance into practice.

A Case in Point

An idealization of effective consultation is the experience with a 70-bed hospital, where much

was achieved and credited by the administrator to the specialist.

In addition to improving dietary services, a major hope of the sponsors had been to reduce dietary costs. In this hospital, the adoption of controls and rescheduling of personnel brought these financial changes:

<i>Year ending</i>	<i>Salary and wages</i>	<i>Supplies and expenses</i>	<i>Total</i>
September 1956-----	\$38,322	\$38,682	\$77,004
September 1957-----	34,662	30,983	65,645
Reduction-----	3,660	7,699	11,359

Significantly, this hospital was the only one of the 33 to reduce the total costs per patient-day during the years in question. The reduction was about equal to the amount saved in the dietary department. Unquestionably, inefficiency had existed there before, but it was the specialist who brought it to the attention of the administrator and showed him ways to correct his problems.

In the period under survey, this hospital (*a*) adopted a written organization plan designating supervisory responsibilities; (*b*) rearranged storage space; (*c*) obtained more efficient kitchen equipment; (*d*) improved dishwashing procedures; (*e*) instituted systematic equipment maintenance and replacement; (*f*) placed the dietary department on a budget; (*g*) adopted new menus for improved nutrition and patients' acceptance; (*h*) began nutritional education for patients; (*i*) provided a food preference system for each patient; and (*j*) adopted inventory controls.

Success Factors

The Connecticut demonstration has more than met the expectations of its sponsors. Although not every one of the member hospitals made maximum use of the proffered services, requests for service from member hospitals have accelerated beyond the heavy demand of the first 18 months. What are the factors that made the program work?

Qualifications of the food service specialist. Voluntary consultation places heavy importance on the ability of the consultant to obtain the respect of both professional peers (in this case, dietitians) and of business-oriented administrators. At the cost of a 5-month delay,

the Connecticut program was allowed to begin only after the sponsors were satisfied that they had found a consultant with the right personal and professional qualifications.

Existence of real need. Stimulus for the Connecticut project was the increasing participation of food management firms in hospital dietary programs. The fact that such firms could move into an area of hospital administration and demonstrate economic savings in spite of their fees signaled the existence of inefficiencies that needed correction. The fact that fewer than half of the Connecticut hospitals had been able to obtain professional direction for their dietary departments was a further clue to the potential value of a program that could be considered a sharing of professional knowledge and skills.

Acceptance of consultation. An accounting consultation service instituted by the hospital association in 1948 was a great advantage to the Connecticut program. This had led to a highly satisfactory program of uniform hospital accounting from which all hospitals had benefited. The success of this project had prepared the ground for acceptance of other consultation services.

Geographic accessibility. It is recognized that Connecticut offers a compact geographic pattern within which a program such as this could operate under near ideal conditions.

There is a real question as to whether a consultant could cover a larger area. Certainly, 33 hospitals are a maximum caseload. This suggests that in larger States regional hospital councils would offer an appropriate center for such a service.

Summary

To make available professional guidance in the areas of dietary and personnel administration to its 33 member general hospitals, the Connecticut Hospital Association was granted funds by the Public Health Service for a demonstration program. Based on initial results, a year's extension to August 1959 has been granted. The association is now studying the possibility of financing the program thereafter on its own.

With the services of a food service specialist, the program resulted in a variety of training conferences throughout the State, the recruiting of professional personnel, guidance to hospitals in new construction and equipment purchasing, and a marked upgrading of standards.

The results of the program would seem to demonstrate that consultation on a voluntary basis is at least as effective as consultation services by State agencies and by fee-for-service firms. Such consultation would seem, furthermore, to be a valid function of the State or regional hospital association.

PHS Nursing Research Program Expanded

The extramural nursing research program of the Public Health Service will be expanded by six new grants and support continued for three projects now underway.

Improved patient care through studies of nursing practice, nursing education, administration of nursing services, and other factors affecting the welfare of patients is the objective of the program, which was instituted in 1955.

The project sites of the six newly approved grants are Cornell University, University of California Medical Centers at Los Angeles and at San Francisco, University of Utah, and Western Interstate Commission on Higher Education, Boulder, Colo.

Grants for nursing research are administered by the Division of Nursing Resources in cooperation with the Division of General Medical Sciences of the National Institutes of Health.

The immediate past president of the American Medical Association reports on organized medicine's programs in the fields of chronic illness, aging and health care of the aged, school health problems, and medical research.

American Medical Association Report

GUNNAR GUNDERSEN, M.D.

SINCE its founding in 1847, the American Medical Association has steadily expanded its activities and services aimed at furthering the organization's primary objectives "to promote the science and art of medicine and the betterment of public health." These programs have multiplied at an ever faster rate during the past 30 years of rapid medical progress.

The changing dimensions of medical knowledge and the accelerated pace of technological progress already have made it difficult for physicians, public health workers, and other health personnel to keep abreast of scientific advances. Now the picture is being further complicated by a multitude of social, economic, and legislative problems which require intensified effort by all concerned.

More than ever before, medicine is intertwined with the worlds of business, industry, labor, government, economics, public opinion, and public affairs. In meeting this situation, the American Medical Association for more than a year has been reorganizing its administrative structure in order to serve both the profession and the public with the greatest possible efficiency and awareness. Under seven

new divisions, business, law, field service, communications, scientific publications, scientific activities, and socioeconomic activities, approximately 40 or more councils, bureaus, committees, and departments will be engaged in a coordinated effort to solve current and future problems in medicine.

It would be impossible in this article to cover even the highlights of all these programs, which were detailed in 300 pages of annual reports in the House of Delegates handbook at the AMA clinical meeting in December 1958. This report, therefore, will focus attention on what the association is doing in such fields as chronic illness, aging, school health problems, and research.

Chronic Illness

The medical and public health progress of the past half century has brought drastic cuts in the incidence and death rates of most communicable diseases. It has sharply reduced infant and maternal mortality. On a wide front it also has produced countless advances against many other diseases that once were serious health problems. As a result, average life expectancy at birth has increased about 23 years since 1900, and there has been a steady rise in the proportion of people living into middle and old age.

Consequently, general medical emphasis in

Dr. Gundersen, who completed his term June 9, 1959, is the 112th physician to serve as president of the American Medical Association. With three of his five brothers who are also physicians, he operates the Gundersen Clinic in La Crosse, Wis.

recent years has been shifting from the infectious, communicable diseases, which used to be the great killers during infancy, childhood, and youth, to the cardiovascular diseases, cancer, arthritis, and the various forms of chronic illness and disability which can occur at any age. This trend also has produced greater attention to rehabilitation, disease prevention, and health maintenance in its most positive aspects.

As individual physicians and investigators began to center more attention on the problems of chronic illness, the American Medical Association moved to provide organized leadership in cooperation with other interested agencies. In 1946 the American Medical Association, American Hospital Association, American Public Health Association, and American Public Welfare Association established the Interim Committee on Chronic Illness. Three years later, this committee became the Commission on Chronic Illness, with representation from the general public, industry, labor, agriculture, education, religion, social sciences, journalism, health, and welfare.

The commission conducted and published numerous studies in the field of chronic illness, some of them in close cooperation with the Public Health Service. When the commission was disbanded in June 1956, the AMA continued to work on various phases of the problem. Our Council on Medical Service, for example, still publishes the *Newsletter on Chronic Illness*, which now goes bimonthly to about 6,500 groups and individuals making up a cross section of medical and allied health fields. The *Newsletter* emphasizes community programs and approaches in the area of long-term illness but now is being expanded to include more material of national scope.

The association continues to collect and maintain a resource file on chronic illness problems and answers a wide variety of requests for information. An important part of this work involves the development of organized home care programs, which provide a comprehensive array of medical, social, and rehabilitative services for patients who do not need all the services of a hospital. The AMA has published an expanded, revised edition of a 1957 survey of organized home care programs in the United

States. The new report covers the operation of 38 such programs currently underway in various parts of the country.

For several years the association has been gathering facts about central information and referral services for the chronically ill. These agencies, designed to serve patients, physicians, and all others concerned with the problems of chronic illness, function as community clearing-houses, and they also assist in factfinding studies and program planning. A survey of five such information centers now operating in Chicago, Milwaukee, Cleveland, San Francisco, and Essex County, N.J., is scheduled for publication. The AMA objective is to help promote widespread development of such centers in order to bring about better coordination in attacking the variegated problems of chronic illness.

In many ways and from various directions, numerous AMA councils and committees concern themselves with chronic illness problems. The Committee on Indigent Care, for example, publishes a steady stream of articles, surveys, and reports dealing with public assistance programs, which by their very nature involve care in chronic illness or disability. The AMA is urging all State and county medical societies to take an active part in assisting the efficient development and operation of the medical aspects of public assistance programs. Guides for medical societies have been formulated to help that effort. In a new policy action in December 1958, the association also recommended that States be permitted to combine the present four public assistance medical programs into a single medical program, administered by a single agency and making uniform services available to all eligible recipients.

The Committee on Medical and Related Facilities, among other activities, gathers facts about chronic illness facilities and nursing homes. As a result of its exhaustive study of the Hill-Burton hospital construction program, completed last year, the AMA is urging that States be given greater flexibility in meeting their needs for chronic illness facilities and nursing homes.

On still another front, the association's Committee on Medical Rating of Physical Impairment is engaged in a long-range project of

developing a series of guides to aid all physicians in making proper determinations under both public and private disability insurance programs. Two of these guides already have been approved and made available to the profession.

As a final example, the Committee on Rehabilitation, with representation from several AMA councils, has outlined objectives and guides for intensified activity by the entire medical profession in the field of rehabilitation. To implement these, our House of Delegates in December 1958 approved a comprehensive plan of action for State and county medical society committees on rehabilitation.

Aging and Care of the Aged

During the past decade or more, the association's increased activity in the field of chronic illness led naturally to realization of the fact that a very large proportion of chronic illness occurs among people in the older age groups. Meanwhile, the growing number of senior citizens, plus a variety of social, economic, and political factors, began to focus more and more attention on health problems of the aged. Accordingly, the AMA House of Delegates in 1954 recommended the establishment of a Committee on Geriatrics, which was formed the following year.

At its very first meeting, however, this committee decided that it could not limit its scope to problems involved in the diagnosis and treatment of older patients. It recognized that practically no diseases are specifically or exclusively diseases of old age, and it saw that it had to think in terms of both the sick and the well. It defined its province as all facets of the aging process, physical, mental, emotional, social, occupational, cultural, and economic, and its name was changed to the Committee on Aging.

Since that time, in coordination with other committees on indigent care, medical facilities, and health insurance and prepayment plans, the AMA Committee on Aging has developed an expanding, intensified program of activities. Beginning in late 1956, it has sponsored a series of six regional conferences on aging, the latest of which was held in May 1959 in Salt Lake City. Basic purpose of these conferences,

which will continue in the future, is to present problems, stimulate medical and lay interest, learn local viewpoints, and promote the creation of active medical society committees on aging.

To speed progress, the AMA in June 1958 approved a set of suggested guides for medical society committees on aging, which provide a blueprint for organization, action, and co-operative projects. By the end of January 1959, all State medical societies and numerous county medical societies had formed such committees.

Through meetings, conferences, and continuing contact, the association has developed liaison with the Department of Health, Education, and Welfare, Public Health Service, American Nursing Home Association, American Hospital Association, Council of State Governments, National Committee on Aging of the National Social Welfare Assembly, Gerontological Society, University of Michigan Division of Gerontology, Federal Council on Aging, and many other national and State agencies interested in care of the aged.

An important result of the liaison with the American Nursing Home Association is the effort to establish and maintain high standards of medical care in nursing homes. Toward this objective, AMA staff members are making a field survey of 50 nursing homes in 22 States. Concurrently, the ANHA is conducting a questionnaire survey of about 4,500 member homes throughout the country. It is hoped that the results of these two surveys can be published this summer. On the basis of these findings, the AMA will formulate recommended guides and standards for medical care in nursing homes.

Following up on the regional meetings that began in 1956, the association last September held a national planning conference for medical society action in the field of aging. It attracted more than 175 representatives of 27 State health departments and of medical societies in 46 States and the District of Columbia. The conference approved a six-point AMA positive program calling for:

- Stimulation of a realistic attitude toward aging by all people.
- Promotion of health maintenance programs

and wider use of restorative and rehabilitative services.

- Extension of effective methods of financing health care for the aged.
- Expansion of training programs for skilled personnel and improvement of medical and related facilities for older people.
- Amplification of medical and socioeconomic research in problems of the aging.
- Leadership and cooperation in community programs for senior citizens.

It was agreed that the multiple activities necessary to implement this program must be carried out with effective medical leadership, a coordinated approach based on State and local needs, and strong effort to prevent isolation of the aged as a separate group in the human family.

Last November the AMA began distribution of 25,000 copies of "Medicine's Blueprint for the New Era of Aging," a booklet based on the six-point positive program presented at the planning conference. A conference report also has been widely distributed, and a new exhibit, based on the six-point program, has been shown at several National and State meetings of interested groups. The exhibit is being scheduled for numerous future showings.

As the AMA stepped up its own aging program, it also joined last year with the American Hospital Association, American Dental Association, and American Nursing Home Association in forming the Joint Council To Improve Health Care of the Aged. Pooling efforts of the four sponsoring groups, the council will study needs, resources, and programs in the field of aging. A working conference was held last February to plan for the council's first national conference, which attracted approximately 500 participants on June 12-14, 1959, in Washington, D.C. The AMA also is urging medical societies to promote the formation of State joint councils.

Meanwhile, in the area of legislation, the association has taken an active interest in constructive measures related to health care of the aged. Strong support was given to the legislation passed by the 85th Congress calling for a White House Conference on Aging to be held in January 1961, to be preceded by State conferences.

One of the medical profession's major objectives in the field of aging is to extend and improve voluntary health insurance, which already provides coverage for more than 40 percent of the population over 65 years of age. For several years the AMA has been urging experimentation in special types of health insurance coverage for the aged, and since last June it has intensified its liaison efforts with Blue Shield, Blue Cross, insurance companies, and other agencies in the prepayment field.

To expedite the growth of effective voluntary health insurance or prepayment coverage for people over 65 years of age with modest resources or low family income, the AMA House of Delegates in December 1958 adopted a proposal urging all physicians to adjust their charges to a level that will permit the development of insurance and prepayment plans at a reduced premium rate for persons now in that population group.

The association has urged all State and county medical societies to implement that policy. By March 1959 at least eight State societies had taken positive steps, and many more were expected to follow suit at annual or special meetings this spring and fall. The Blue Shield Medical Care Plans, which have a special committee studying all phases of the problem, recently developed a model insurance contract for persons over 65 years of age, incorporating the principle of the AMA policy action. The Health Insurance Association of America is urging all member companies to develop special and continuing coverage for retired persons. In recent months a number of private insurance companies either have announced new policies for the aged or have extended existing policies to more and more States.

Developments in this area are moving at a rapid, accelerating pace. The Health Insurance Association of America estimates that 60 percent of our senior citizens, who want and need it, will have protection by the end of next year. The figure is expected to rise to 75 percent in 1965 and 90 percent by 1970, but actual growth may exceed these conservative estimates.

Meanwhile, the AMA is planning for the future in all aspects of the aging problem. All

State medical societies have been urged to cooperate actively in development of the State conferences on aging which will precede the White House Conference on Aging in 1961. The association is working closely with the Department of Health, Education, and Welfare in this whole program, as well as in the development of homemaker services and nursing home classification systems. A highlight of the AMA June 1959 annual meeting in Atlantic City was a special scientific session on the medical aspects of aging. The association is pushing distribution of a new health appraisal form to stimulate increased physician participation in health maintenance programs. And the AMA itself plans sponsorship of a number of regional conferences on aging for medical, paramedical, and lay groups at some time in the near future.

In short, the American Medical Association is working hard to provide leadership for a concerted, positive, voluntary effort in the field of aging.

School Health Problems

Always interested in the health of school children, the AMA since 1911 has been cooperating actively with the National Education Association in the Joint Committee on Health Problems in Education. This committee, which met at AMA headquarters in March 1959, works to gain interprofessional recognition of principles and policies affecting the health of school-age Americans. Its findings and opinions are publicized by both of the sponsoring organizations.

As far back as 1918, AMA representatives on the joint committee were influential in declaring health to be the first of seven objectives in education. In 1922 the association declared in favor of periodic health examinations for all persons, including the school-age child. Since 1923, when the AMA began publishing *Hygeia*, now called *Today's Health*, this consumer magazine has been used to focus attention on a wide variety of school health subjects. For many years, as an aid to teachers, the association's Bureau of Health Education prepared discussion questions based on articles in *Today's Health*, which were widely used as classroom material in health education.

Independently and in partnership with the NEA, the American Association for Health, Physical Education, and Recreation, and the American Association of School Administrators, the AMA makes numerous contributions through periodic literature, pamphlets, and monographs dealing with school-age health. It also has been responsible in whole or in part for five major books: "Health Education," "Healthful School Living," "School Health Services," "Health in Schools," and "Fit To Teach."

Since 1926, the association has cooperated with the National Congress of Parents and Teachers in its program for child health, and there always has been an AMA representative on the PTA National Committee on Summer Roundup, recently renamed Child Health.

Maintaining continuous liaison, five traveling representatives of the AMA Bureau of Health Education attend or participate in numerous conferences, workshops, symposiums, panel discussions, and other activities involving school health. With the assistance of the association, an increasing number of medical societies are conducting similar activities at the State and local level through school health committees or other units. Individual physicians are active on boards of education, in school and community health conferences, parent-teacher programs, and cooperative projects with public health officers.

A focal point and clearinghouse for information is the National Conference on Physicians and Schools, held every 2 years under AMA sponsorship. These biennial conferences, which began in 1947, now attract more than 200 representatives of medical societies, health departments, school systems, and national voluntary or Government agencies. Plans are now underway for the Seventh Conference on Physicians and Schools to be held in October 1959.

The association's new Committee on Injury in Sports is developing a comprehensive program to safeguard the health of high school and college athletes. A special Committee on Amphetamines and Athletes is studying the use of such drugs as they relate to athletics. The AMA also is represented on the President's Citizens' Advisory Committee on the Fitness of American Youth.

Research

Through its councils on drugs, foods and nutrition, medical physics, mental health and scientific assembly, and committees on research, pesticides, toxicology, and cosmetics, the AMA is continually reporting on research advances in its scientific publications and at its annual and clinical meetings.

In addition to these extensive activities, the association's Committee on Research is engaged in a program of cooperative clinical investigation and collaborative reporting. This approach is being applied to the study of problems in which no one investigator has a large enough series of cases to warrant publication of conclusive findings. The subcommittees on breast and genital cancer, diabetes and pregnancy wastage, and blood dyscrasias are gathering and analyzing case reports in their spheres of interest. A new Subcommittee on Publications is being considered to solicit original articles, abstracts, and reviews dealing with research advances in the basic medical sciences. Through its Committee on Research the AMA has been active in stimulating nationwide interest in the problem of staphylococcal infections in hospitals. The association conducts a grants-in-aid program to supplement existing research projects, making 88 awards which totaled approximately \$30,000 last year.

The AMA right now is studying ways and means of improving and expanding its activities in the entire field of research. The American Medical Research Foundation has been established to initiate and encourage necessary medical research and to correlate and disseminate the results of studies already underway. As soon as legal and financial technicalities are

settled, the foundation will embark on a program which the AMA hopes will be an effective, vital force in the Nation's research effort.

In another action related to research, the association's House of Delegates in December 1958 recommended the creation of a mechanism which will assume the responsibility for promoting active liaison with each national medical society. "In the scientific fields," the house declared, "the role of the AMA should be primarily that of leadership, but every endeavor should be made to bring about coordination of the special fields of scientific interest of the other national medical organizations." Within its own administrative structure, the association also is planning to establish a research department that will concentrate on socioeconomic problems.

Going beyond our national boundaries and demonstrating a sincere interest in the promotion of international health, the American Medical Association is giving full, enthusiastic support to the current legislation which would establish a national advisory council for international medical research and a national institute for international medical research.

Conclusion

The four areas covered in highlight fashion, chronic illness, aging, school health, and research, represent only a fraction of the American Medical Association's total activity aimed toward public and professional service. It is hoped, however, that this report reflects the spirit of progressive, positive action in which the AMA views present and future medical problems.

The prevalence of tuberculin sensitivity indicates a high infection rate in the lower Yukon area. Comparison with results in two Southern States suggests that tuberculin reactions should be interpreted according to the prevalence of nonspecific sensitivity.

Tuberculin Sensitivity and Tuberculosis Among Natives of the Lower Yukon

GEORGE W. COMSTOCK, M.D., D.P.H., and MERILYS E. PORTER, R.N., M.P.H.

TUBERCULOSIS has been the major health problem of Alaska natives for a long time. Only in the past few years can it be considered to have been brought under control in the sense that facilities for diagnosis, isolation, and treatment of infectious cases are now reasonably adequate.

Aside from the obvious fact that the prevalence of tuberculous infection and disease is extremely high, little is known of the epidemiological aspects of tuberculosis among the native population. Some information regarding tuberculin sensitivity among Alaska natives was obtained during two BCG vaccination programs, one by Aronson in southeastern Alaska in 1938 (1) and the other by the Alaska Department of Health from 1948 to 1951 (2).

Because of the limited information on this subject, it appeared desirable to report the results of a tuberculin survey of the villages along the Yukon River during the spring of 1957.

Both authors are with the Bureau of State Services, Public Health Service. Dr. Comstock is epidemiologist, Tuberculosis Branch, and Miss Porter is chief nurse of the Epidemiology Unit, Arctic Health Research Center, Anchorage, Alaska. (Manuscript received for publication March 10, 1959.)

In addition, the relationship of the size of tuberculin reaction to the prevalence of tuberculosis in this and other populations has important implications for the interpretation of tuberculin sensitivity.

Material and Methods

The original purpose of the tuberculin testing was to obtain baseline data regarding the prevalence of infection prior to the initiation of a controlled trial of isoniazid prophylaxis in the Bethel area of Alaska. This area included the deltas of the Yukon and Kuskokwim Rivers, and is bounded on the west by the Bering Sea, and in the interior by lines from Goodnews Bay and Unalakleet to McGrath (fig. 1). Because the testing teams were available for only a short time before the spring breakup of ice would make travel temporarily impossible, their efforts were concentrated in the villages in the northern half of the area to take advantage of the fact that breakup normally occurs a little later along the Yukon than along the Kuskokwim.

The tests were given and read by three experienced nurses from the tuberculosis program of the Public Health Service, assisted by the

staff of the ambulatory chemotherapy program of the Arctic Health Research Center. All participants were given 5 tuberculin units (T.U.) (0.0001 mg.) of PPD-S. In most instances, the tests were read on the second day; a few readings on the third day have also been included. The transverse diameters of both erythema and induration were carefully measured and recorded to the nearest millimeter.

According to the most recent village rosters, which were brought up to date at the time of the testing, 2,930 persons resided in the 19 villages selected for testing. Tests and readings were completed satisfactorily for 2,285 persons, or 78 percent of the total population, and 91 percent of those at home on the day of the tests (table 1). Many of the remaining 9 percent who did not come in for testing or reading lived far enough from the village centers that they could not come when traveling conditions were poor. The largest group of non-participants were those classified as "working or visiting," a large proportion of whom were away on hunting trips. It is likely that many of these persons would have participated if it had been possible to set up a definite schedule in advance of the arrival of the testing teams.

The study population has been restricted to natives of the selected villages with completed tests and identification data. In addition to nonparticipants, 72 whites have been excluded,

Figure 1. Villages participating in the tuberculin testing survey in the Bethel area of Alaska, 1957.



• = PARTICIPATING VILLAGE

as have 2 natives for whom no birth date was available. The study population thus consists of 2,211 persons, 1,777 of whom are classified as Eskimo, 429 Indian, and 5 as mixed Eskimo and Indian. Many of each race have some admixture of white blood.

Table 1. Participation in the tuberculin testing survey among natives of the lower Yukon, 1957

Participation category	Number	Percent
Total population of villages	2,930	100.0
Persons with completed test	2,285	78.0
Persons with no or incompleting test	645	22.0
In village on day of test	225	7.7
Tested, no reading	75	2.6
Sick at home	16	.5
Did not come for test	129	4.4
Known refusals	5	.2
Away on day of test	420	14.3
Hospitalized	112	3.8
In boarding school	52	1.8
Working or visiting	256	8.7

Results

In order to interpret the results of any tuberculin testing survey, it is necessary to consider the problem of nonspecific tuberculin sensitivity, since it is now clear that the true extent of tuberculous infection in a population can be masked by the coexistence of tuberculin sensitivity resulting from infection with other organisms (3). Some evidence on this point was available prior to the survey.

First, atypical acid-fast organisms classified as photochromogens or nonphotochromogens have not been observed in specimens from patients at the Alaska Native Health Service Hospital in Anchorage, even though

scotochromogens were not uncommon. Although this sort of negative evidence is not conclusive, neither can it be entirely ignored, since it is based on work done by Alice Timpe, Alaska Native Health Service, Anchorage, a bacteriologist experienced in the recognition of atypical acid-fast bacilli (4). It does suggest that presently recognized and naturally occurring sources of nonspecific tuberculin sensitivity are probably not highly prevalent in this population.

We expected to find tuberculin sensitivity resulting from BCG vaccination—in some respects the prototype of nonspecific sensitivity—in this population, since BCG vaccination had been done sporadically since 1949 in the Bethel area. It was therefore necessary to identify as accurately as possible the persons in the study population who had been vaccinated and those who had not. This was accomplished by matching, for the tested villages, the tuberculin test records with the vaccination files of the Alaska Department of Health and the ambulatory chemotherapy program of the Arctic Health Research Center.

It is considered that the identification of those who were vaccinated is quite accurate, but a few persons may have been vaccinated without this fact having been recorded, while others may have been vaccinated in villages not included in the testing program. Consequently, some persons classified in this study as unvaccinated may in fact have been vaccinated. We believe that this is not an appreciable source of error except for those under 10 years of age in 1957.

The choice of antigen used for testing is also related to the subject of nonspecific sensitivity, since some antigens detect nonspecific sensitivity better than others. In this survey, the standard antigen given to everyone in the study population was 5 T.U. of PPD-S. In addition, 301 participants were also given an equivalent dose of a PPD prepared from an organism originally classified as a *Nocardia* but later found by others to resemble a *Mycobacterium* (5,6). The reactions to this antigen, PPD-C, reflect some types of nonspecific sensitivity much better than do those to PPD-S (7). Among the 301 persons tested with both antigens, 243 showed some induration to one

or both preparations. Sixty persons reacted only to PPD-S; four reacted only to PPD-C. Of the 179 reacting to both, only 1 had a significantly larger reaction to PPD-C than to PPD-S. These findings suggest that the kind of nonspecific sensitivity detectable by PPD-C is uncommon in this population.

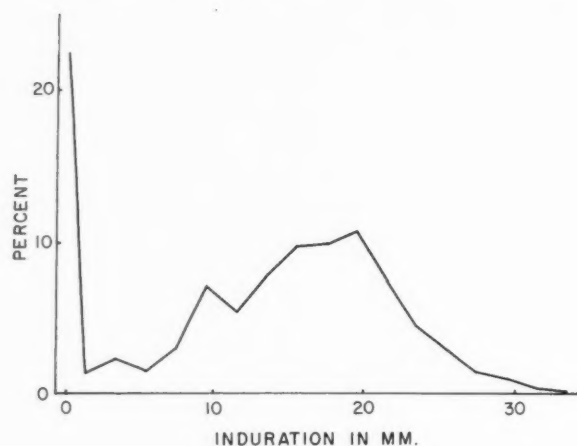
Perhaps the question of whether or not the lower Yukon natives manifest nonspecific sensitivity to the 5-T.U. dose of PPD-S is best answered by the characteristics of the frequency distributions of reaction sizes to this antigen (table 2, fig. 2). The curve of the percentage distribution for the entire study population is bimodal, with 23 percent showing no induration to 5 T.U. of PPD-S. Of those with some induration, there are more persons with very small reactions than with very large reactions. This was noted by each of the three readers and suggests that there is some nonspecific sensitivity in this population, for it seems reasonable to believe that reactions from a single, specific infection would approximate

Table 2. Distribution of sizes of reactions to 5 T.U. PPD-S among natives of the lower Yukon, 1957

Size of induration (mm.)	Total study population	0-14 years		15 years or older	
		Unvaccinated	Vaccinated	Unvaccinated	Vaccinated
Total	2,211	908	321	953	29
0, E ¹	501	343	129	27	2
1, 2	31	16	11	4	0
3, 4	51	23	18	9	1
5, 6	35	4	5	25	1
7, 8	67	22	7	37	1
9, 10	159	45	14	97	3
11, 12	124	38	9	75	2
13, 14	170	53	14	101	2
15, 16	217	73	22	117	5
17, 18	219	64	16	135	4
19, 20	236	90	28	115	3
21, 22	165	54	26	80	5
23, 24	100	36	7	57	0
25, 26	64	20	6	38	0
27, 28	33	11	6	16	0
29, 30	22	11	0	11	0
31, 32	9	2	1	6	0
33, 34	3	2	0	1	0
35, 36	1	0	0	1	0
37, 38	1	0	11	0	0
39, 40	2	0	1	1	0
48	1	1	0	0	0

¹ E=Erythema only.

Figure 2. Distribution of sizes of reactions to 5 T.U. PPD-S among 2,211 natives of all ages, lower Yukon area, 1957.



a normal curve of distribution, and that excess reactions of any size would very likely have been caused by something else.

It has already been mentioned that some non-specific sensitivity resulting from BCG vaccination might be expected in this population. To investigate this possibility, it is first necessary to establish a baseline, which is provided by the distribution of reaction sizes among persons over the age of 15 years who had no history of vaccination (table 2, fig. 3).

Except for a spur at 9-10 mm. of induration (which appears to be the result of terminal digit preference), the distribution closely approximates a normal one, and is consistent with the notion that the tuberculin test is measuring sensitivity to a single specific infection. Indeed, this distribution, with a mean reaction size of 15.9 mm., is almost the same as those found among patients in tuberculosis hospitals (8). Consequently, we have further reason to believe that there is little, if any, non-specific sensitivity among unvaccinated persons in this area of Alaska which can be detected by the 5-T.U. dose of PPD-S.

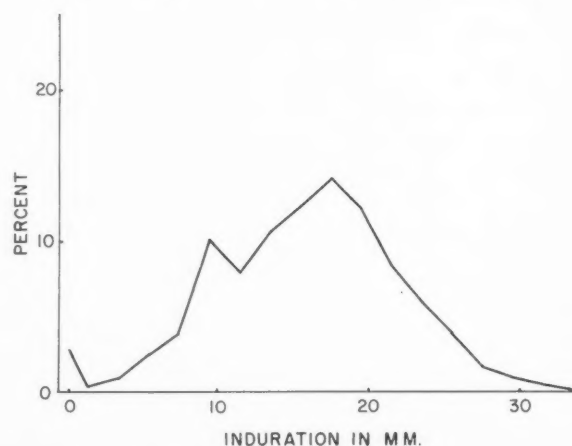
The amount of nonspecific sensitivity resulting from previous BCG vaccination can be estimated from a comparison of the distribution of reaction sizes among vaccinated and unvaccinated persons. Because very few adults had been vaccinated, it is necessary to restrict the comparison to persons under the age of 15 years. Among both groups, the vaccinated and the un-

vaccinated, about 40 percent had no reaction at all to 5 T.U. of PPD-S (table 2, fig. 4). The most apparent difference between the two groups is that 9 percent of the vaccinated had reactions of 1-4 mm. in diameter, whereas only 4 percent of the unvaccinated had reactions of this size. If the comparison is limited to persons with reactions of 5 mm. in diameter or larger, the percentage distributions for the vaccinated and unvaccinated are very similar and do not differ significantly.

Since both distributions are also very similar to that for unvaccinated adults, it seems reasonable to infer that in the lower Yukon area reactions of 5 mm. or larger to the 5-T.U. dose of PPD-S reflect sensitivity resulting from natural infection. For if postvaccinal sensitivity were as strong as that resulting from natural infection, one would not expect to find an excess of very small reactions among the vaccinated without a concomitant excess of larger reactions. The most reasonable explanation of the observed finding is that vaccination in this population resulted in a low level of allergy, and that the spectrum of reactions larger than 5 mm. is probably the result of natural infection which may or may not be superimposed on postvaccinal sensitivity.

That there was in fact a low conversion rate attributable to vaccination is suggested by an examination of the proportion of those with reactions of 5 mm. or more induration among

Figure 3. Distribution of sizes of reactions to 5 T.U. PPD-S among 953 unvaccinated natives, 15 years or older, lower Yukon area, 1957.



the 350 vaccinated persons of all ages. Sixty of these persons had been vaccinated in 1956, or less than 16 months prior to testing (table 3). Only 11, or 18 percent, had reactions of 5 mm. or more in diameter. Although the proportion of reactors increases markedly as the time between vaccination and testing lengthens, this increase is about what would be expected from the natural infection rate in these communities. These findings suggest that either the vaccine used, or the conditions of vaccination, or both, resulted in a very low level of tuberculin sensitivity from vaccination.

Furthermore, aside from the low proportion of small reactions attributable to vaccination, it seems fair to conclude that there is probably no nonspecific sensitivity in this population which can be detected by the 5-T.U. dose of

PPD-S. Consequently, estimates of the prevalence of tuberculous infection will not be very far wrong if they are based on reactions of 5 mm. or more in diameter. Smaller reactions may be either the result of vaccination or the "left hand tail" of the distribution of reactions from specific infection. In some respects this is a most fortunate circumstance, for had BCG vaccination been as effective in causing tuberculin conversions in this population as it has been reported to be in other vaccinated groups, the interpretation of tuberculin sensitivity would have been made much more difficult, and in some respects, impossible.

The prevalence of tuberculous infection in the study population may now be considered, defining a reactor as anyone with 5 mm. or more of induration. Females had slightly

Figure 4. Distribution of sizes of reactions to 5 T.U. PPD-S among 908 unvaccinated and 321 vaccinated natives under 15 years, lower Yukon area, 1957.

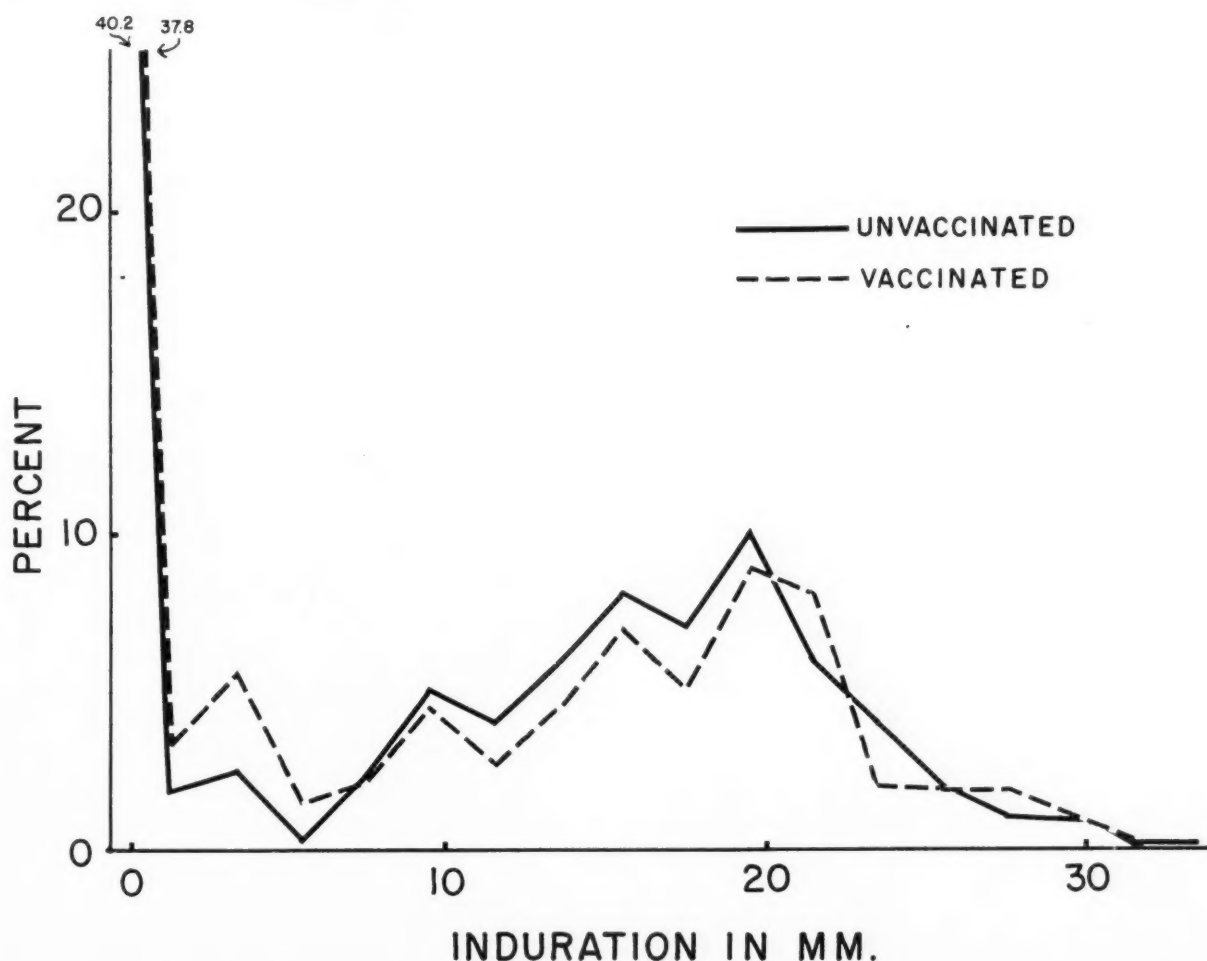


Table 3. Vaccinated natives with reactions of 5 mm. or more induration to 5 T.U. PPD-S, lower Yukon area, 1957, by year of vaccination

Year of vaccination	Total vaccinated persons	Persons with 5 mm. or more induration in 1957	
		Number	Percent
Total.....	350	189	54.0
1956.....	60	11	18.3
1955.....	24	6	25.0
1952.....	102	52	51.0
1951.....	17	10	58.8
1949.....	140	107	76.4
Other ¹	7	3	-----

¹ Includes 4 with vaccination year not stated; 1 each vaccinated in 1950, 1953, and 1954.

larger tuberculin reactions on the average than males. There were no significant differences between Eskimos and Indians, a finding in apparent disagreement with that reported by Weiss (2), who found somewhat lower reactor rates among interior Indians than among Eskimos of the Yukon and Kuskokwim deltas. However, his populations were drawn from a larger area than that of this study.

There were tremendous differences in tuberculin sensitivity with age (table 4, fig. 5). The prevalence of reactors was 22 percent in the age group 0-4 years, and it increased rapidly

up to the age group 15-19 years, which had a prevalence of 96 percent. This high level was maintained to 65 years, with a moderate decrease among older persons. Among persons with a history of vaccination, except in the youngest age group where the prevalence among the vaccinated was slightly but not significantly higher, the prevalence of positive reactions was generally lower than among persons classified as unvaccinated. At first glance, this seems to be a disturbing finding. But when it is recalled that the vaccinated had been previously selected as negative reactors, that vaccination appears to have caused relatively little sensitivity, and that the subjects were presumably exposed thereafter to a very high natural infection rate, the differences between the vaccinated and the unvaccinated in this respect appear more reasonable.

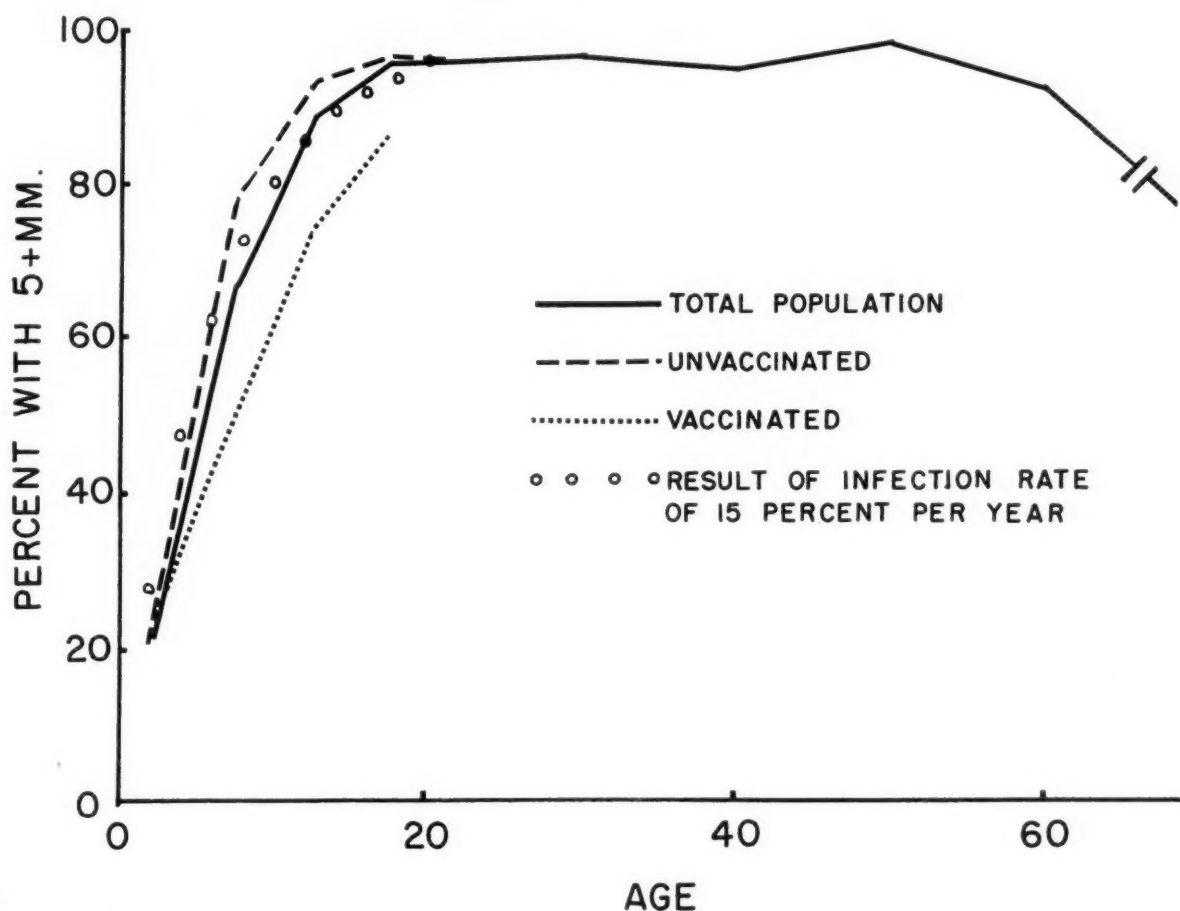
Because of vaccination, even though its effects were not great, it is impossible to ascertain with certainty the infection rate that has prevailed among this population in recent years. However, it can be shown that a prevalence ratio of 96 percent at age 20 can only be achieved by an average infection rate of 15 percent per year. The prevalence resulting from this theoretical rate is indicated by open circles in figure 5. Vaccination cannot affect this average rate since practically no one older than 20 years had been vaccinated.

The average infection rate experienced by

Table 4. Natives with reactions of 5 mm. or more to 5 T.U. PPD-S, by age and vaccination status, lower Yukon area, 1957

Age in 1957 (years)	Total			Unvaccinated			Vaccinated		
	Persons tested	5 mm. or more		Persons tested	5 mm. or more		Persons tested	5 mm. or more	
		Number	Percent		Number	Percent		Number	Percent
Total.....	2,211	1,628	73.6	1,861	1,439	77.3	350	189	54.0
0-4.....	460	99	21.5	389	81	20.8	71	18	25.4
5-9.....	436	293	67.2	265	207	78.1	171	86	50.3
10-14.....	333	297	89.2	254	238	93.7	79	59	74.7
15-19.....	220	211	95.9	197	191	97.0	23	20	87.0
20-24.....	160	154	96.2	158	152	96.2	2	2	-----
25-34.....	227	221	97.4	227	221	97.4	0	0	-----
35-44.....	167	160	95.8	166	159	95.8	1	1	-----
45-54.....	103	102	99.0	103	102	99.0	0	0	-----
55-64.....	60	56	93.3	58	54	93.1	2	2	-----
65 or over.....	45	35	77.8	44	34	77.3	1	1	-----

Figure 5. Natives with reactions of 5 mm. or more to 5 T.U. PPD-S, by age and vaccination status, lower Yukon area, 1957.



younger persons is more problematical. If one accepts that vaccination in this particular instance did not appreciably affect the proportion of persons with reactions of 5 mm. or more in diameter, it would be reasonable to utilize the experience of the total group as reflecting the prevalence of tuberculous infection at various ages.

In any event, since an average annual infection rate of 15 percent would produce the observed prevalence at age 20, and since the points on the observed curves fall progressively below the theoretical ratio as age decreases below 20 years, it seems likely that the infection rate 20 years ago was appreciably higher than 15 percent, and that more recently it has fallen to a much lower level, possibly in the neighborhood of 5 percent per year. This is still a much greater infection rate than that reported for the United States as a whole, which has been esti-

mated to be about 0.1 percent per year at the present time (9).

The definition of a positive reactor accepted in the preceding sections was an arbitrary one, based partly on the fact that the 5-mm. level of reaction excluded the most noticeable effects of vaccination, and partly on common usage. However, for some time the wisdom of using the same definition of a positive reactor in all areas has been questioned. In areas where nonspecific sensitivity is very common, defining positive reactors as those persons with 5 mm. or more of induration to the 5-T.U. dose may classify so many persons with false positive (nonspecific) reactions among the positive group that the separation of true positives from true negatives is very unsatisfactory. On the other hand, in areas where there is little or no nonspecific sensitivity, the same definition of positive reactors may yield a relatively pure

group of truly infected persons, but the group classified as negative may also include a number of infected persons. Some evidence that this does, in fact, occur may be gathered from comparing the frequency of tuberculous disease among persons with different sizes of tuberculin reactions in two geographic areas.

The experience of Muscogee County, Ga., and Russell County, Ala., where there appears to be a great deal of nonspecific sensitivity to the 5-T.U. dose may be contrasted with that of the lower Yukon area where there appears to be very little. In the spring of 1950 a tuberculin testing and chest X-ray survey was conducted in Muscogee and Russell Counties, in which the participants received 5 T.U. of PPD (RT XIX-XXI, supplied by the State Serum Institute, Copenhagen, Denmark).

All persons classified as having suspected or definite tuberculosis on the basis of the survey followup examination had their records and films reviewed after 6 years of observation. The followup examinations were quite extensive for most of them, but for a few they consisted only of a single, large chest film. On the basis of the available evidence—extensive or scanty—but without consideration of the

tuberculin sensitivity of the subjects at the time of the survey, a decision was made as to whether or not the findings appeared to have warranted classifying persons as tuberculous or suspected of having tuberculosis. Persons so classified on the basis of this retrospective review are counted as cases in the present analysis.

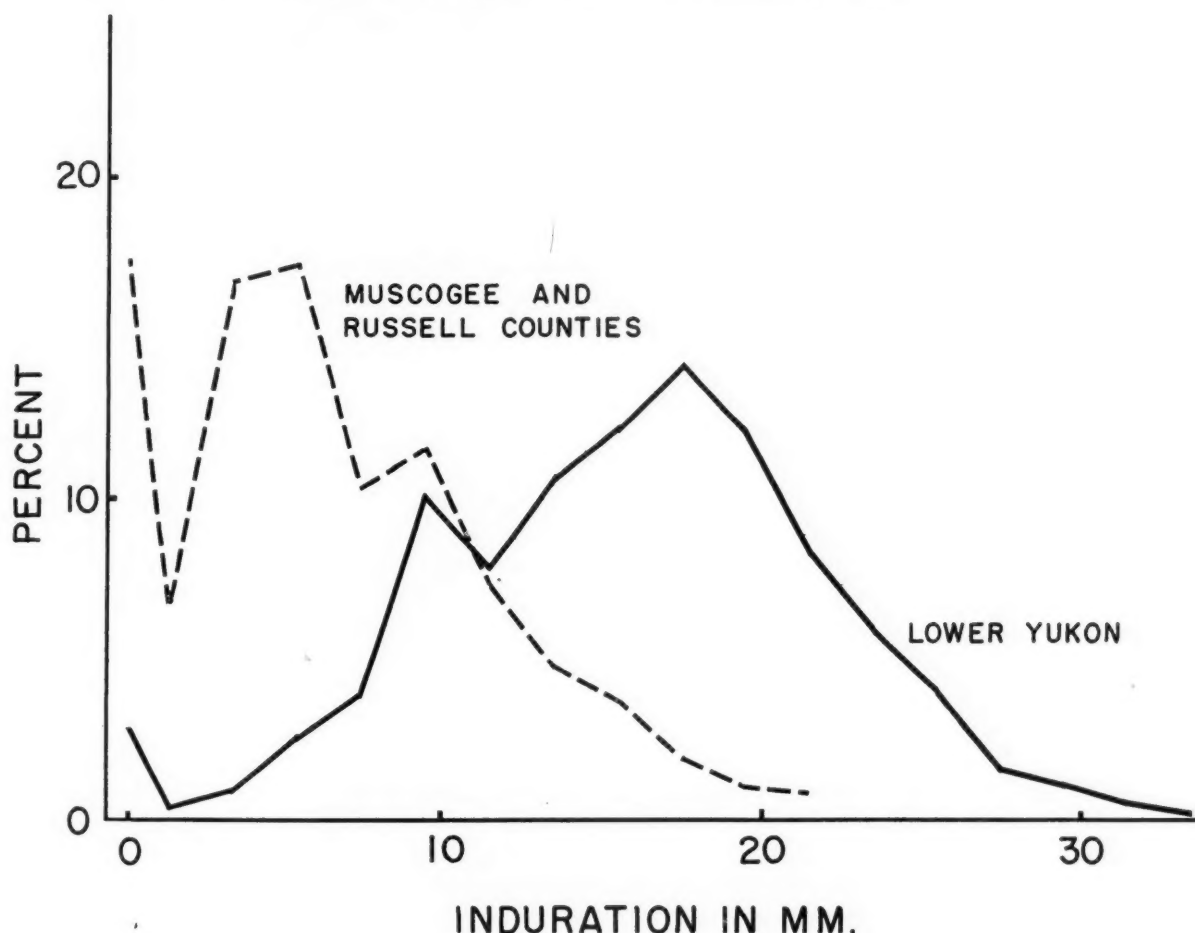
For the participants in the tuberculin testing survey along the lower Yukon, the records from the X-ray survey of the villages during the preceding year were matched against the tuberculin test cards. For those who had been tested and X-rayed, the diagnosis made by the Alaska Department of Health was utilized to define a case, accepting as such all those classified as having suspected or definite reinfection-type tuberculosis. As in the Muscogee-Russell area, this diagnosis in some instances was based on a single film; in others, it was substantiated by a long period of followup examinations, including bacteriological and clinical studies. The clinical diagnosis was independent of the tuberculin findings of the survey.

In both areas, the great majority of cases appeared to be inactive at the time of the X-ray survey. However, 24 percent of the cases in the lower Yukon area and 18 percent

Table 5. Distribution of sizes of reactions to 5 T.U. PPD among unvaccinated persons over 15 years of age in two geographic areas

Size of induration (mm.)	Lower Yukon natives, 1957		Residents of Muscogee and Russell Counties, 1950		Percent of persons with 1 mm. or more induration	
	Number	Percent	Number	Percent	Lower Yukon	Muscogee and Russell
Total	953	100.0	47,236	100.0	100.0	100.0
0, E	27	2.8	8,227	17.4		
1, 2	4	.4	3,118	6.6	.4	8.0
3, 4	9	.9	7,912	16.7	1.0	20.3
5, 6	25	2.6	8,176	17.3	2.7	21.0
7, 8	37	3.9	4,867	10.3	4.0	12.5
9, 10	97	10.2	5,499	11.6	10.5	14.1
11, 12	75	7.9	3,505	7.4	8.1	9.0
13, 14	101	10.6	2,336	4.9	10.9	6.0
15, 16	117	12.3	1,769	3.7	12.6	4.5
17, 18	135	14.2	927	2.0	14.6	2.4
19, 20	115	12.1	514	1.1	12.4	1.3
21 or more	211	22.1	386	.8	22.8	1.0
0-4	40	4.2	19,257	40.8	1.4	28.3
5-10	159	16.7	18,542	39.2	17.2	47.5
11 or more	754	79.1	9,437	20.0	81.4	24.2

Figure 6. Comparison of distributions of sizes of reactions to 5 T.U. PPD among unvaccinated persons 15 years or older in two geographic areas.



of those in the Muscogee-Russell area have had positive bacteriological findings at some time.

There is a marked difference between the two populations in the distribution of reaction sizes to 5 T.U. of PPD in unvaccinated persons over 15 years of age (table 5, fig. 6). Half of the reactions in the Muscogee-Russell area are smaller than 7 mm.; in contrast, half of the reactions in the lower Yukon area are larger than 16 mm. On the basis of unpublished studies in Muscogee and Russell Counties and studies by Nissen Meyer (10), only a small part of this difference can be attributed to differences in the antigens used in the two areas.

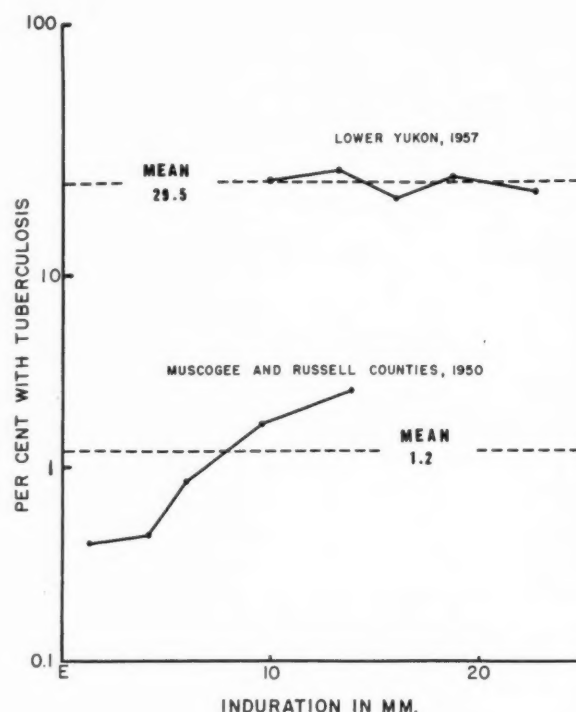
Before examining the relationship of tuberculous disease to the size of tuberculin reaction, one more difficulty must be considered. It is well known that there are definite reader differ-

ences which may enter into the problem of interpreting tuberculin sensitivity. Although several different readers participated in the Muscogee-Russell survey, it was possible to have each reader measure reactions from all major segments of the population. In the lower Yukon area, this could not be done. One reader, for instance, worked in the villages near the mouth of the Yukon; the other two farther up the river and in Unalakleet. The readings by the first reader formed a distribution about 3 mm. smaller on the average than the readings of the other two nurses. This difference appeared to have been a personal one—it did not appear to be associated with village, race, sex, age, or vaccination status—and is consistent with differences noted in the readings of these three nurses on other series of comparative readings.

Such reader differences would not have been of critical importance except that the prevalence of tuberculosis was appreciably higher in the villages near the mouth of the Yukon, those tested by the first reader, than among the villages tested by the other two. Such a situation obviously tends to produce a "built-in" correlation between smaller reactions and increased prevalence of tuberculosis. However, when each reader's subjects were studied separately, the relationships between reaction size and frequency of tuberculosis were similar for each of the three groups.

It therefore appeared reasonable to combine the results for all three readers, but only if this could be done in such a way that the "built-in" correlation could be avoided. First, to eliminate the possible effects of vaccination, the subjects in both areas were restricted to unvaccinated persons over the age of 15 years. Then, for each reader in the lower Yukon survey, the subjects who showed some reaction (erythema or any induration) to the 5-T.U. dose were ranked by size of reaction, and each of the three groups was divided into fifths or quintiles. The quintiles from each reader's subjects with the smallest reactions were combined to form the first quintile of the total group, those with the next larger reactions were combined to form the second quintile, and so on. The subjects from the Muscogee-Russell area with some reaction to 5 T.U. of PPD were also divided into quintiles. In both areas, the populations were divided in such a way that each quintile would

Figure 7. Prevalence of reinfection-type pulmonary tuberculosis among unvaccinated reactors 15 years of age or older in two geographic areas, by size of reaction to 5 T.U. PPD.



contain a whole number of persons; the cases were allocated on a proportionate basis which resulted in fractional numbers of cases being assigned to each quintile.

The total prevalence of tuberculosis among adults with some reaction to the 5-T.U. dose

Table 6. Prevalence of reinfection-type pulmonary tuberculosis among unvaccinated reactors,¹ 15 years of age or older in two geographic areas, by size of reaction to 5 T.U. PPD

Quintile	Lower Yukon				Muscogee and Russell Counties			
	Midpoint of interval	Number of persons	Persons with tuberculosis		Midpoint of interval	Number of persons	Persons with tuberculosis	
			Number	Percent			Number	Percent
Total	16.1	692	204.0	29.5	6.2	41,893	496.0	1.18
1st	9.8	138	42.4	30.7	1.3	8,378	34.2	.41
2d	13.3	138	47.1	34.1	4.1	8,379	37.7	.45
3d	16.1	140	34.2	24.4	6.2	8,379	71.5	.85
4th	18.9	138	43.5	31.5	9.3	8,379	141.8	1.69
5th	22.8	138	36.8	26.7	14.0	8,378	210.8	2.52

¹ Defined as all persons with some erythema or induration to the 5-T.U. dose of PPD.

was very different in the two areas, being nearly 30 percent in the lower Yukon area and only 1.2 percent in Muscogee and Russell Counties (table 6, fig. 7). In the lower Yukon area, there was no significant difference in the frequency of tuberculosis among persons with different sizes of tuberculin reactions, whereas in Muscogee and Russell Counties, there was a marked and progressive increase in the frequency of tuberculosis with increasing size of the tuberculin reaction. The same relationships were noted when the cases were restricted to bacteriologically confirmed cases from the two areas.

Previous reports have noted that there is a positive correlation between size of tuberculin reaction and subsequent incidence of tuberculosis, similar to that noted for prevalence of tuberculosis in the Muscogee-Russell area (11-14). For such a relationship, there could be at least two explanations. One is based on the notion that allergy to tuberculoprotein is harmful to the host, and that demonstrable disease is therefore more likely to be present among those with the highest levels of allergy. The second is that among persons with small reactions, there are many in some areas who are not infected with tubercle bacilli but with something else much less pathogenic, while persons with large reactions have almost all been infected with tubercle bacilli.

Either hypothesis is consistent with the findings from Muscogee and Russell Counties, and with the reports on incidence of tuberculosis according to the size of tuberculin reactions. However, the first hypothesis does not fit with the findings from the lower Yukon area; the second is entirely consistent. These findings therefore indicate that the degree of allergy per se does not appear to be related to the likelihood of having tuberculous disease, and provide additional support for the concept of non-specific sensitivity (15-17).

Discussion

Those who are unfamiliar with the tuberculosis situation among Alaska natives may have difficulty in accepting that almost 30 percent of the adults in these 19 villages had X-ray findings compatible with past or present tu-

berculosis. However, there is evidence that this extraordinary prevalence of tuberculosis is not exaggerated. Historical records suggest that the arrival of the white man in Alaska was closely followed by the appearance of tuberculosis among the natives (18). This soon assumed the characteristics of an epidemic, which only in recent years has appeared to be subsiding. Prior to 1952, the recorded tuberculosis mortality for Alaska natives was well in excess of 500 per 100,000 (19, 20); for the years 1953-56, the average annual death rate for the Bethel area was 282, according to unpublished data from the Arctic Health Research Center. Also consistent with the epidemic character of tuberculosis in this population is the prevalence of tuberculin sensitivity, which is as high, if not higher, than any recorded in recent years. In the International Tuberculosis Campaign, only a few cities in Poland, Yugoslavia, and North Africa had reactor rates approaching those among natives of the lower Yukon (21).

In an area where tuberculosis is so common, it might be suspected that most pulmonary abnormalities would be classified as tuberculous. However, an independent reading of several hundred films from the Bethel area by Comstock yielded prevalence rates essentially the same as those derived from film readings by the Alaska Department of Health. In addition, similar findings have been noted in the Eskimo population of Greenland. Helms (22) reported that 41 percent of the adults in Angmagssalik during the period 1948-51 showed some X-ray evidence of pulmonary tuberculosis; and in 1956, Stein and Groth-Petersen (23), in a very thorough survey of the native Greenlanders, found that 29 percent of those over 15 years of age showed lung changes of a tuberculous character. On the basis of the available evidence, it is our opinion that the reported prevalence of tuberculous lesions in the present study population is entirely reasonable.

Confidence in the lack of an association between the size of the tuberculin reaction and X-ray evidence of reinfection-type tuberculosis in this study population is strengthened by the fact that the same relationship was observed when the cases were restricted to persons with a history of positive bacteriological findings.

In addition, a similar relationship was also noted for pulmonary calcifications which, with the virtual absence of histoplasmin sensitivity in this population (24), are likely to represent the residuals of healed primary tuberculosis.

The comparison between the findings in the lower Yukon area and those in two counties in the southeastern United States clearly illustrate the difficulties imposed on the interpretation of tuberculin sensitivity when this is attempted on the basis of a single standard for negative and positive reactions regardless of the prevalence of nonspecific sensitivity. In populations similar to the unvaccinated adult natives of the lower Yukon area, if the findings of this study can be confirmed by further investigation, it may be that any reaction to 5 T.U. of PPD-S can be considered as positive for tuberculous infection.

On the other hand, in areas like Muscogee and Russell Counties, where nonspecific sensitivity is very common, a simple dichotomy of reactions into negative and positive can never be entirely satisfactory. If the dividing line is placed fairly low on the scale of tuberculin sensitivity, say between 4 and 5 mm. of induration to the 5-T.U. dose, the negative group will contain relatively few persons infected with tubercle bacilli, but those classified as positive will include many who are infected with something else. Shifting the dividing line to 15 mm. would probably reduce the false positives to a negligible proportion, but would result in classifying many persons infected with tubercle bacilli among the negatives.

For those areas where nonspecific sensitivity is commonly encountered, a further subdivision into more categories than the two of negative and positive in common usage should be seriously considered. At the very least, it would seem wise to interpose an additional category of "doubtful" for those persons with intermediate-sized reactions of 6 to 10 mm. to the 5-T.U. dose. With such a classification, the negative reactions of 0 to 5 mm. would very largely signify the absence of tuberculous infection, and the positive reactions of 11 mm. or more of induration would very largely signify that tuberculous infection had occurred. Reactions of 6 to 10 mm. would quite properly be labeled doubtful, since in areas with more than

one cause for tuberculin sensitivity, testing with the 5-T.U. dose of PPD-S alone cannot differentiate specific reactions of this size from non-specific reactions.

The present study is only a small contribution to a long series initiated by Palmer and his associates to apply the concepts of the normal distribution of attributes in biological populations to the problem of tuberculin sensitivity in humans from many geographic areas (15-17, 25). By using standardized antigens and careful techniques of measurement, it has been possible to show that the varied patterns of sensitivity elicited in different populations can only be explained satisfactorily by the existence of tuberculin sensitivity caused by something other than the tubercle bacillus. Although this concept has shattered the apparent simplicity of the tuberculin test as a casefinding and diagnostic tool, its application to the practical uses of tuberculin testing will result in the resolution of some of the former enigmas of tuberculin sensitivity and in a more accurate subdivision of tested populations into those who are truly infected with tubercle bacilli and those who are not.

The ability to make this subdivision with as much discrimination as possible is becoming progressively more important. For as tuberculosis declines in many areas to the point where it may be controlled, the seedbed of disease will more and more come to be those who have been infected in the distant past. These must be identified as accurately as possible if maximum progress is to be maintained toward the eradication of tuberculosis.

Summary

In 1957, tuberculin tests were given to 2,211 natives living in 19 villages along or near the lower Yukon River in Alaska. The test antigen was 5 T.U. of PPD-S, and all reactions were carefully measured by experienced nurse readers. Consideration of the distributions of reaction sizes suggests that there is little non-specific tuberculin sensitivity detectable by this dose of tuberculin in this native population, except for some sensitivity attributable to BCG vaccination.

The prevalence of positive tuberculin reac-

tions increased markedly with age, reaching a level of 96 percent in the age group 15 to 19 years. This represents an average infection rate of 15 percent per year. It appears that the infection rate was even higher 20 years ago, and appreciably lower in recent years.

Among unvaccinated adult reactors to the 5-T.U. dose, the prevalence of active and inactive reinfection-type tuberculosis was almost 30 percent, and was essentially the same among persons with small and large tuberculin reactions. In contrast, in Muscogee County, Ga., and Russell County, Ala., where there is a great deal of nonspecific sensitivity, the prevalence among unvaccinated adult reactors was 1.2 percent, and was much higher among persons with large reactions than among those with small reactions. This finding is interpreted to signify that the prevalence of tuberculosis does not vary with the degree of allergy from specific infection, and as being consistent with the concept that there is considerable nonspecific tuberculin sensitivity in the Muscogee-Russell area and little if any in the lower Yukon area.

The problem of defining a positive tuberculin reactor is discussed, and it is suggested that the definition selected should vary according to the prevalence of nonspecific sensitivity in the area under consideration.

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Radioactivity Levels in Milk Samples

The levels of radioactivity in milk collected during February 1959 from 10 sampling stations across the country remained below the levels currently suggested as permissible by the National Committee on Radiation Protection and Measurements.

The milk sampling network of stations is part of the program of the Public Health Service for measurement of radioactivity in air, water, and food. In reporting on radioactivity levels in milk, the Service will continue to make comparisons with the permissible levels of the national committee.

The only levels thus far developed for radiation exposure for the general population are those recommended by that committee and the International Commission on Radiological Protection. Both bodies recognize that the general population should be considered separately from industrial workers

exposed to radioactivity. The national committee has recently revised its 1953 recommendations for industrial workers, but left those for the general population unchanged. The international commission has made recommendations regarding radiation exposure for the general population which are being studied by the national committee.

The national committee, in a statement of April 23, 1959, considers "that undue risks to the population will not be incurred by following current policies for a while longer, during which time it is hoped that methods may be established for a meaningful analysis and control of population exposure."

Both the monthly levels and the yearly averages for all radioactivity in milk samples remained below permissible levels suggested by the national committee.

Yearly average levels ¹ of radioactivity in milk samples, period ending February 1959

Area	Calcium ²	Iodine-131 (3,000)	Strontium-89 (7,000)	Strontium-90 (80.0)	Barium-140 (200,000)	Cesium-137 (150,000)
Cincinnati, Ohio.....	1.142	33	69	9.8	24	64
New York, N.Y.....	1.094	28	37	6.7	15	62
Sacramento, Calif.....	1.133	31	25	5.0	6	57
Salt Lake City, Utah.....	1.147	28	22	4.5	8	46
St. Louis, Mo.....	1.266	83	140	15.1	48	86

¹ Expressed in micromicrocuries per liter (a curie is a measure of radioactivity equivalent to that produced by 1 gram of radium, and a micromicrocurie is 1 millionth of a millionth of a curie).

² In grams per liter.

NOTE: The figures in parentheses are the maximum permissible limits for lifetime exposure of population groups to the specific radioisotopes in water, derived from the current recommendations of the National Committee on Radiation Protection and Measurements.

*Excerpts from a discussion of facts, fancy, and corruption
in the interpretation of science to the public.*

Quackery and the News

WALLACE F. JANSSEN

IN the past half century, there has been a profound change in the attitude of the press, and the lay public, concerning the news of science. Editors were inclined at one time to regard the scientist as a long-haired character, a sort of modern Merlin muttering mathematical incantations over his test tubes. Today the scientist is a respected source of important news. With this has come a tremendous increase in the amount of information about science which is reaching the public.

A study on "Science, the News, and the Public," made for the National Association of Science Writers, revealed that Americans get their science news primarily from newspapers, with television and magazines ranking close together as the next most popular sources.

In 10 major categories, medical news was third in reader popularity, outranking even such topics as sports, comics, and crime. Thirty-seven percent of the newspaper readers reported that they read all the health news they can find, as compared with 28 percent who read the nonmedical science news.

Not only has there been a great increase in

the volume of medical news but it seems entirely likely that this situation will continue.

Is this good? Or is it a Frankenstein monster that we must tame, control, or learn to live with?

Certainly the dissemination of knowledge is good. Undeniably, however, lay press reporting of news on health and medicine has had some undesirable characteristics and side effects as well as good effects.

The years since World War II have seen unprecedented progress in the development of new drugs. Antibiotics, for example, have revolutionized the treatment of infectious diseases and all but wiped out some of them. But we have seen how the publicizing of these miracle drugs has in some instances led to excessive and indiscriminate use with harmful consequences. Patients and their relatives beg physicians to use this or that product. Fads and fashions in the use of newly popular preparations are familiar to the medical profession.

A standard pattern has been observed in the life history of highly publicized drugs. First is the period of "great expectations." Often this begins before the drug is on the market. Stories appear reporting that some researcher has hit on a promising new compound that may be of value in treating some more or less common affliction. For many writers these are bread-and-butter pieces—a standard item of journalistic merchandise. A series may be published on developments in a research program. Finally the great day comes when the

Mr. Janssen, director, Division of Public Information, Food and Drug Administration, U.S. Department of Health, Education, and Welfare, delivered the Williams Memorial Lecture in the 24th annual series, "Lectures to the Laity," at the New York Academy of Medicine, November 1958. Full text of the series, entitled "Science, Man's Master or Servant," will be published by the academy.

The Health of Science

In certain areas of science, where empirical data are still hazy, a point of view may acquire a kind of cult following and harden into rigid dogma. Modifications of Einstein's theory, for example, sometimes meet a resistance similar to that which met the original theory. And no doubt the reader will have at least one acquaintance for whom a particular brand of psychoanalysis has become virtually a religion, and who waxes highly indignant if its postulates are questioned by adherents of a rival brand.

Actually, a certain degree of dogma—of pig-headed orthodoxy—is both necessary and desirable for the health of science. It forces the scientist with a novel view to mass considerable evidence before his theory can be seriously entertained. If this sit-

uation did not exist, science would be reduced to shambles by having to examine every new-fangled notion that came along. Clearly, working scientists have more important tasks. If someone announces that the moon is made of green cheese, the professional astronomer cannot be expected to climb down from his telescope and write a detailed refutation. "A fairly complete textbook of physics would be only part of the answer to Velikovsky," writes Prof. Laurence J. Lafleur, in his excellent article on "Cranks and Scientists" (*Scientific Monthly*, November 1951), "and it is therefore not surprising that the scientist does not find the undertaking worthwhile."—*Excerpt from "Fads & Fallacies in the Name of Science" by Martin Gardner.*

new product goes on the market. But this does not end the process of publicity. Other newsworthy developments occur and are reported, including sometimes the discovery of unforeseen and unfortunate adverse reactions. This results in a second standard type of story, warning about the consequences that may result from improper use of a well-known and highly touted preparation.

Up to this point we have been talking about the interpretation of science via the major channels of public information, the wire services, newspapers, magazines, radio, and television. Much of their medical and health news comes from professional sources, research workers, clinicians, and the public relations people associated with the sponsoring organizations.

An increasing proportion of such news is being reported by science writers, men and women who are specializing in this field of reporting. They have an association, the National Association of Science Writers, now 25 years old.

There is no very precise definition of a science writer, but one distinction is that a growing number observe the practice of checking stories with their sources. To many general news reporters this is anathema, censorship, but the

science writer finds that it often helps to improve his story as well as to insure the confidence of his sources. There has been a marked improvement in the quality of science reporting, and this trend continues.

But there are other sources and channels of information on health, medicine, and science. And there are many who interpret science to the public. We need to be at least as much concerned about the misinterpretation of science to the public as we are about its interpretation. Pseudoscience and quackery, as well as legitimate news of science, find their way into the media of communication.

Of course, quackery is nothing new. Surprisingly, however, in this day when so much good information is available, quackery seems to be growing. More and more, people believe in miracles, not only the real miracles of scientific achievement but also the fake miracles of promoters and charlatans.

Quackery Is Big Business

Quackery in the United States is big business. The medical director of the Hoxsey cancer clinic testified he had personally seen 6,000 patients in 2 years. In his book "You Don't Have to Die," Harry M. Hoxsey said he had

10,000 patients taking his treatment, a statement the Food and Drug Administration did not think exaggerated.

Mr. Hoxsey called his medicine "chemotherapy." It cost \$400 plus \$60 of incidental expenses. The American Medical Association called it a cough sirup. It might also be called a mild laxative, since it contains cascara sagrada along with such other ingredients as prickly ash bark, burdock, poke root, and extract of red clover blossoms.

The promotion of the Hoxsey treatment is a classic illustration of how unfortunate people may be misinformed regarding a life-or-death problem—the treatment of cancer. It is the more significant in view of its success at a time when millions of dollars and the best efforts of health educators were being devoted to providing correct and reliable information on the treatment of cancer, and to urge early treatment.

A variety of methods were used and to some extent are still being used to promote the Hoxsey treatment. One of these was the purchase of editorial space in nationally circulated magazines. The late Rev. Gerald K. Winrod, of Wichita, Kans., was paid \$82,000 for promoting the treatment in his *Defender* magazine. This circulated mainly to Protestant fundamentalist groups in rural sections and small towns. A newsstand publication called *Man's Magazine* was paid for printing illustrated articles composed largely of testimonials. These were the same ones which Hoxsey has been using for years and which were investigated by the Food and Drug Administration and exposed in open court. Millions of reprints of these articles were used by Hoxsey for promotion purposes. The *National Christian Crusader*, published by Rev. Dr. Merle E. Parker of Santa Ysabel, Calif., devoted its columns to attacking the Food and Drug Administration and the medical trust, and boosting the Hoxsey treatment. Circulation of the *Crusader* was reported to exceed 1 million copies. These were not all of the periodicals which promoted the Hoxsey cure in their editorial columns.

Most of the pro-Hoxsey publicity was obtained after the issuance of the first injunction against the treatment in 1952. The publishers cooperated notwithstanding a decision of the

U.S. Court of Appeals holding that the medicine had been proved worthless for the treatment of cancer. Some of the articles, in fact, reported the Government's efforts to stop the sale of the medicine and described it as "controversial," a word which to some editors and broadcasters seems to justify copy they would not otherwise tolerate.

Is it possible, when a medical myth has been widely disseminated, to mount a successful counterattack? Many are skeptical about this, including some public health authorities. They have the idea that any publicity about a worthless remedy will only serve to advertise it.

In April 1956, when it was clear that litigation to stop distribution of the Hoxsey treatment might be prolonged for years, a nationwide public warning was issued under authority of section 705 of the Federal Food, Drug, and Cosmetic Act. It was widely published by the press, and although some papers devoted as much space to printing Mr. Hoxsey's protests and denunciations as they did to the Government's warning, the warning was effective. There was an immediate and drastic reduction in patronage of the clinics, both at Dallas, Tex., and Portage, Pa. By a conservative estimate, in the first 30 weeks after the warning was issued, at least 3,000 people had been dissuaded from being taken in by the false promise of a quick and painless cure, without recourse to methods that could really have helped them.

Especially effective was a condensed version of the warning sent to farm, lodge, and church periodicals. These reached older people and residents of rural areas, groups most exposed to the Hoxsey publicity. Some editors of these papers received numerous abusive letters from pro-Hoxsey readers. Not one of these editors retracted what they published. Several of them commented to us that the need for information was indeed serious, in view of the number of people who apparently believed in the treatment.

As any editor can tell you, a correction of a story will not reach exactly the same people who read the original incorrect story. Similarly, more publicity is needed to offset a medical lie than to spread it in the first instance. In January 1957, the public warning was reissued,

this time as a handbill for display in U.S. post offices, hospitals, and other public buildings. This poster was possibly the most effective educational medium of all.

Quackery in Nutrition

The most widespread quackery in the United States today is in the field of nutrition. The American Medical Association says it is costing some 10 million Americans \$500 million each year. This racket is based on misstatement of the facts of the science of nutrition.

More people seem to believe more bunk about food and nutrition than about any other single topic in the health field—and perhaps any other field. It is this widespread dissemination, and the zealous faith of believers in nutrition nonsense, that make it difficult to combat. Food faddism today has aspects of an organized movement that is self-supporting and actively seeking new converts.

The nature of this racket, and the false concepts which promote it, can be learned from the court actions brought by the Food and Drug Administration. The oldtime patent medicine man is back again—but this time he is a “nutrition educator” who rings your doorbell and tries to persuade you that a shotgun mixture of vitamins and minerals, plus some secret factor which nutrition scientists have not yet identified, is the answer to all your health problems.

Vitamin products have a recognized place in modern preventive medicine, but they are not cure-alls, and it is dangerous for anyone to assume that such products can be relied on to treat unidentified ailments. The price charged for only one package of some of these products is enough to pay for several visits to a doctor.

Numerous self-styled “authorities” on nutrition write books and articles, lecture, and sometimes even teach in our colleges. Some of them have no training whatever in nutrition science. A number of so-called “health food lecturers” have been the target of court actions brought by the Food and Drug Administration. One of them recently completed a 1-year prison term. He was convicted on misbranding charges, resulting from claims that his peppermint tea, vegetable soup mix, and wheat germ oil would restore sexual power and cure such conditions as arthritis, cancer, and diabetes.

Recent court actions under the Federal Food, Drug, and Cosmetic Act include these cases:

Capsules of unsaturated fatty acid from safflower oil with vitamin B. This was recommended by a health food store for preventing and treating practically all heart ailments, obesity, and glandular disorders.

Liquid unsaturated fatty acid from safflower oil with vitamin E, represented as effective for maintaining low blood cholesterol levels and overcoming heart disease.

Lecithin, falsely represented as a cure for hardening of the arteries, high blood pressure, coronary thrombosis, diabetes, prostate trouble, and other conditions.

An especially disturbing feature of food faddism is persistent emphasis on the theme that the American food supply, unmatched in quality throughout the world, is deficient, over-processed, or poisoned by fertilizers, pesticides, and food additives. There are indeed serious new problems of food protection brought about by changing technology that are under constant study, but nothing to warrant the grossly irresponsible and inaccurate statements which have appeared in some faddist books and sensational magazines.

Effective Counteraction

Broadly speaking, effective counteraction against faddism and quackery requires the interest and cooperation of all organizations and agencies concerned with the problem, private and public, lay and professional, local, State, and national. This is particularly the case in the field of information and education. I am glad to say that there is already a great deal of such cooperation.

The Commissioner of Food and Drugs recently pointed out that the public has always had difficulty in distinguishing the orthodox from the unorthodox remedy or practitioner, but that “science today has given us the means of distinguishing with considerable certainty the effective from the ineffective. Likewise our laws, based upon medical knowledge, distinguish between what is legal and what is illegal.” More should be done in explaining these distinctions to the public, as well as applying them in law enforcement.

East of the Elbe

IN ADDITION to literature covered by *Excerpta Medica*, by the Russian Translation Service sponsored by the Public Health Service, or by private enterprise, a number of medical publications issued in Communist territories are the subject of notes, abstracts, or full translations which appear twice a month in *Scientific Information Report* (mimeographed), sold by the Office of Technical Services, U.S. Department of Commerce, for \$2.75 a copy or \$28 a year.

In keeping with the intent of Congress, these translation services aim not to distribute information directly to a large audience but to provide librarians, editors, reporters, and scientific investigators with access to original materials, if desired.

The following selections from the medical literature which is covered in the *Scientific Information Report* from July 25, 1958, through January 23, 1959, are intended only to suggest the kind of public health information that may be found. They are merely a sample of a sample.

There is no intent to evaluate the significance or validity of the items mentioned.

In the following paragraphs, reference to specific documents is given as follows: the name of the senior author, the publication number of the *Scientific Information Report*, and the document number. All issues of the report are designated by the code number PB 131891-T. The reference (*Frucht 14, 79*) would therefore refer to PB 131891-T14; item 79, a translation from *Das Deutsche Gesundheitswesen*.

Service Statistics

Goals of the Sanitary Epidemiological Service for 1959-65 were reported to the All Union Scientific Society for Hygienists, in Mos-

cow, February 21, 1958. Objectives include 1 epidemiologist per 25,000, 1 sanitary physician per 40,000, 1 industrial sanitarian per 14,000 workers, 1 school sanitarian per 12,000 urban students, and 1 physician bacteriologist per 35,000 (*Lebedev 5, 94*).

Long-range public health plans for Kazakh S.S.R. call for 24,800 more medical personnel by 1965, a 13-percent increase. It is hoped to double the number of health officers: at present, there is 1 for every 70,000 people. This report contains considerable data on hospitals and medical facilities (*Lobova 2, 77*).

Morbidity

The first all-Russian conference of epidemiologists, microbiologists, and infectionists was held in Moscow in 1957. The 400 delegates and guests approved establishment of an all-Russian scientific medical society for the professions represented.

Nikolayeva, R.S.F.S.R. Deputy Minister of Health, reported complete eradication in the Russian Soviet Federated Socialist Republic of plague, cholera, typhus, smallpox, and other infectious diseases. She said that mass outbreaks of typhoid fever and malaria had ceased. The major concerns she reported were influenza, tickborne encephalitis, poliomyelitis, epidemic hepatitis, and prevention of dysentery, typhus, and diphtheria.

Professor Boldyrev stressed the need to improve sanitary conditions, to improve cultural levels, and to sharpen differential diagnosis of enteric diseases in a program to reduce enteric infections. Reports by Smorodintsev, Tokarevich, and Bunin dealt respectively with virology, rickettsioses, and clinical management of dysentery (*Belikov 7, 87*).

Uzbekistan now boasts 188 sanitary-epidemiological stations, 160 bacteriological labora-

tories, and 33 pasteurization stations. Registered cases of malaria have dropped from 121,000 in 1950 to 659 in 1956. Smallpox has been "liquidated" since 1936 (*Zairov 9, 57*).

Diphtheria in Byelorussia was reported in 1957 to be 9.8 per 10,000 population, 30.6 percent below the 1956 rate (*Rubinshteyn 4, 41*).

Environmental Services

In recommending filtration and active dilution of air pumped out of nuclear reactor power stations, a Czechoslovakian paper concludes it is necessary to develop less hazardous types of reactors (*Anon. 2, 67*).

The first "scientific-practical" conference on sanitary inspection of food products for the entire Soviet Union was held in Moscow in June 1958. (Reports of the principal speakers are summarized lightly in the translation.) Leading causes of "food poisoning" were bacterial infection, primarily of meat, followed by dairy products (*Krapirner 16, 84*).

A Committee for the Protection of Atmospheric Air has been established in the Main State Sanitary Inspectorate of the U.S.S.R. Ministry of Health by an order dated May 5, 1958. Chairman is Prof. V. A. Ryazanov, director of the chair of communal hygiene of the Central Institute for the Advanced Training of Physicians (*Anon. 10, 91*). A book on air pollution control, published in 1957, is the subject of a translated review (*Gernet 10, 93*).

Gamma rays are used to sterilize bandages impregnated with antibiotic medication, by the Division of Antiepidemic Defense of the Central Scientific Research Disinfection Institute. The dose to inactivate anthracoid spores is reported to be 1.5–2.0 million roentgens (*Anon. 5, 66*).

Studies of radiopotassium (K^{40}) find 2.3×10^{-11} curies per liter in mixed city sewage, 6×10^{-12} in suburban sewage, and 1.7×10^{-11} curies in sewage from industrial areas. In nature, K^{40} in city sewage is thought to be in the range of 6×10^{-12} curies per liter. The per capita discharge in the city is estimated at 300 micrograms of K^{40} per day, about 2×10^{-9} curies (*Dolivo-Dobrovolskiy 6, 50*).

Nonpathogenic spore soil saprophytes re-

sistant to chlorination in a public water supply of the Donbassvodrest have created difficulties in applying the bacterial count standards for water quality. An investigation is reported in detail (*Natanson 16, 82*).

Preventive Medicine

Merger of rayon hospitals with sanitary-epidemiological stations was discussed at the fifth congress of the Medical Workers' Trade Union, Moscow, May 29, 1958. Golovkova said that with the present workload, a medical district physician has no time to organize preventive work. Popov said that mergers have been beneficial in rural districts, but that the distribution of the physician's work is unsolved.

Delegates also complained that too little attention is given to the health and safety of medical workers, that the Ministry of Health issues directives without enforcing their application. Research workers were chided for giving too little heed to public health needs, but Suchkova in turn chided public health workers for failing to keep up with medical advances.

In order to extend the effectiveness of medical services, with an average of 1 physician for 600 people, M. D. Kovrigina, Minister of Health, urged strengthening outpatient clinics, and said they must arrange to eliminate waiting lines and to treat people in the evenings or on their day off from work. The number of physicians may be increased at the expense of auxiliary branches of the profession. Also, she proposed reduction of the volume of paperwork by doctors.

She and others stressed the value of health education. It was asserted that more than 500,000 medical deputies of Red Cross and Red Crescent societies are seeking to provide health information for the public.

The conference voted approval of a resolution supporting suspension of nuclear tests (*Anon. 4, 54*).

Of 684 themes announced for 86 hygienic establishments of the R.S.F.S.R. Ministry of Health, 284 deal with labor hygiene and prevention of occupational disease. The balance of the score card is: radiation hygiene, 102; water hygiene, 99; hygiene for children and

adolescents, 57; nutrition and food sanitation ("the rational use of food for separate groups of the population and the prophylaxis of alimentary diseases"), 55; the hygienic basis for planning, organization, and construction, 44; atmospheric hygiene, 43 (*Anon. 5, 98*).

Concerned with "the great practical significance of protecting persons from respiratory affection with bacterial toxin," an investigation is studying this potential in *Bacillus botulinus* toxin, "which has no equivalent in strength" (*Yakovlev 5, 56*).

For potential rabies victims, it is recommended that antirabies gamma globulin containing specific antibodies be applied directly to the wound, in conjunction with antiseptics and antibiotics, before administration of the vaccine. (*Solov'yev 3, 52*).

A lozenge held to be prophylactic against streptococci, staphylococci, and other microbes consists of 1,000 gamma gramicidin, 0.07 gram ascorbic acid, 0.002 gram tannin, and 1 gram of sugar and filler (*Anon. 2, 72*).

Persistence of rabies, especially among foxes and other wild animals, has prompted production of a hyperimmunization serum by the State Institute for Rabies Inoculation at Potsdam (*Starke 10, 81*).

Aerosols of volatile oils in a sealed room were found to be effective against *Staphylococcus albus* at Kiev. Eucalyptus appeared to be the most effective oil tested; lavender the least (*Vedibeda 8, 70*).

Production of diagnostic materials in the Soviet Union is deficient with respect to brucellosis, tularemia, and many viral and rickettsial diseases (*Meshalova 9, 72*).

Immunization against brucellosis can be combined with simultaneous subcutaneous inoculation against tetanus, investigators in Moscow conclude on the basis of animal experiments (*Chian Shun-ch'u 16, 74*).

Epidemiology

Among measures recommended at the 12th session of the U.S.S.R. Academy of Medical Sciences, it was proposed: A statistical bureau for the study of the role of population factors in pathology and for working out the methodological indexes for the study of hereditary

diseases should be established in the Institute of the Organization of Public Health. A laboratory of the heredity of man and a laboratory of radiobiology should be organized within the Institute of Experimental Biology and the Institute of Experimental Medicine, U.S.S.R. Academy of Medical Sciences (*Anon. 6, 63*).

Pathology, immunology, and mode of transmission of influenza is being investigated, with respect to the biological and colloid-chemical properties of a virus aerosol trapped in a sponge filter made of gelatin (*Rechmenskiy 1, 68*).

The mucous membrane of the nose is the essential point of infection of animals susceptible to hoof-and-mouth disease, it is concluded from experiments in pathology reviewed for the Thuringian Section of the Scientific Society for Veterinary Medicine in East Germany (*Potel 6, 61*). (This entire review is published in translation.)

Occupational Health

A review of dissertations on labor hygiene by candidates for science degrees found the following topical interests most prominent, in the order given: occupational poisons, industrial dust, physiology of labor, microclimate, industrial trauma, and a miscellany including changes in atmospheric pressure, noise and vibration, morbidity, research methods, and sanitation. The author noted with regret that although the economy requires an increased production of insecticides, only three dissertations related to their toxicity (*Yegorov 16, 85*).

Foam rubber is found satisfactory as a dust filter in face masks tested at the Leningrad Sanitary Hygienic Medical Institute. The filter can be washed with ordinary soap and water and used again effectively, but it offers no "satisfactory standard for pore size" (*Koryukayev 7, 66*).

A cherry-extract drink is found more effective than a 0.5-percent gaseous solution of salt for quenching thirst, preventing dehydration, and maintaining efficiency of men working in high temperatures, according to a Tashkent study, at a Uzbek metallurgical plant. The drink is now the customary beverage in shops where heat is intense (*Anon. 8, 79*).

Neurophysiological effects of vibrations are the general subject of a series of experiments reviewed in one chapter of a book issued by the State Publishing House of Medical Literature, Leningrad (*Mogendovich 9, 84*).

Protracted systematic vibration retarded the accumulation of body weight in young rats in an experiment performed at the Moscow Sanitary Hygiene Medical Institute (*Lebedeva 7, 65*).

A chemical called Unitol was reported effective in treating 25 clinic patients suffering from absorption of arsenic and mercury compounds (*Belonozhko 1, 60*).

Diagnosis and Therapy

The basic aim of the new Institute of Physiology and Pathology of Women (Institut Fiziologii i Patologii Zhenshchiny) established at Tbilisi by the Georgian S.S.R. Ministry of Health, first of its kind in the Soviet Union, is to increase the birth rate. It seeks to decrease the incidence of abortions and find solutions to infertility (*Anon. 11, 102*).

To detect the presence of cancer in the organism, a Czechoslovakian news report asserts, A. Chizhevskiy, of the oncological institute in Karaganda, has devised a mathematical formula for the movement of blood cells in the veins (*Anon. 5, 63*).

Tetraethylmonothiopyrophosphate was administered subcutaneously in a dose of 0.06 mg/kg. to mice suffering traumatic injury to the sciatic nerve, and induced recovery two to three times more rapidly than in controls. The application of the chemical in victims of poliomyelitis was mentioned as a possibility (*Lenkevich 11, 75*).

Animal experiments indicate that muscles repair and restore themselves more rapidly if supplied with a direct deposit of minced muscle tissue (*Gavrilova 11, 95*).

A transistorized transmitter, 610 grams, 4.4 x 9 x 14 cm., was built by the Institute for Applied Physiology of the East German Academy of Social Hygiene, Labor Hygiene, and the Advanced Training of Physicians, Berlin. It is used for obtaining electrocardiographs (*Frucht 14, 79*).

Tape recordings are being used to hypnotize

some patients in the psychotherapeutic department, headed by Dr. Wicht, in the polyclinic of the Friedrich-Schiller University of Jena, which celebrated its 400th anniversary in 1958 (*Anon. 7, 94*).

Use of radiophosphorus to diagnose breast cancer produced some evidence that absorption of phosphorus by the malignant tumor depends on the intensity of the processes of renewal of the nucleic acids in the growing area (*Dmitriyeva 4, 66*).

A Czechoslovakian spray gun for treatment of second-degree burns uses a mixture of thrombin, antibiotic, plasma, and oxygen to form a film (*Bares 10, 86*).

Ordinary gypsum, used in therapy of burns, is reported to be an excellent physical antiseptic, also eliminating pain in the burned area and preventing plasmorrhesis. It was applied to 264 patients at the surgery clinic of the Odessa Institute for the Advanced Training of Physicians. Burns of 34 patients covered more than 40 percent of the body (*Meľnik 8, 66*).

Eradication of schistosomiasis by mass treatment is a near-term objective of the People's Republic of China (*Kochergin 11, 99*).

Artificial teeth were implanted in jawbones of unspecified animals. Connective tissue grew in the canals of the plastic roots and ossified. Attempts at implants in humans were not successful, but experiments with nonirritating alloys are in preparation (*Bazhanov 1, 76*).

Laboratory Services

Dead or alive, rickettsiae are made visible for study by fluorochromes and special optical apparatus. Clearest contrast and most intensive luminescence was achieved by staining the organisms with rivanol or auramine in an aqueous solution, one part to a thousand (*Mitereva 4, 44*).

For observing ornithosis virus particles by means of fluorescence under a microscope, an aqueous solution of acridine orange (1:30,000) is reported to be the most effective dye. A bright green light contrasts with dull luminescence in other formations (*Neustroyev 16, 69*).

Luminescent microscopy, employing fluores-

cent dyes, used in observing agents of herpes, hoof-and-mouth disease, lymphogranuloma, swine plague, chickenpox, shingles, encephalitis, psittacosis, and other viral diseases, has been employed also in the study of tickborne encephalitis. The process is described in translation in detail. An illustration of the apparatus and two electrophoregrams are included in the original paper (*Izotov 8, 68*).

Information Services

It is proposed to expand and expedite publication of reports of Soviet research in radiobiology: fewer than a third of the reports sub-

mitted in 1956 and 1957 have been printed (*Anon. 3, 65*).

Soviet participation in international medical programs has resulted in a rise in their contributions to Western journals and an increased attendance at international conferences. Nearly 2,000 abstracts of works by Soviet specialists have been published in *Excerpta Medica*, and 6 special editions of that journal have been devoted to Soviet works (*Ivanova 7, 88*).

Continuous courses have been organized for raising the qualifications of sanitation physicians, chemists, bacteriologists, laboratory assistants, and workers of sanitary-epidemiological stations (*Anon. 7, 91*).

Translations From Russian Medical Works

The Russian Scientific Translation Program, set up in the National Institutes of Health, Public Health Service, in July 1956, distributed 42 completely translated issues of several Soviet journals to 400 research libraries during 1958. The issues represent a total of 1,470 papers in biochemistry, biophysics, experimental biology and medicine, microbiology, epidemiology, immunology, hematology and blood transfusion, oncology, virology, and physiology.

From the program's inception until October 1957, the activities concerned principally the supply of supplementary materials to scientific groups for their independent evaluation of Soviet experimental work. During fiscal 1958 the emphasis shifted to materials for evaluation, field by field. Future plans include a mechanism to gauge both the needs of the scientific fields for information and the adequacy of the program in fulfilling those needs.

The cover-to-cover translation of basic science journals is a major feature of the program.

Another activity has produced 2,990 abstracts of Soviet medicine in four quarterly issues for both basic medical sciences and

clinical medicine. Another 5,100 more abstracts are in prospect.

The program also provides grants to support preparation of reviews of Soviet literature by American scientists in such fields as cardiovascular physiology, neurochemistry, nutrition, defectology, and air pollution. Also, a list of 300 Russian scientific review papers were sent to about 150 editors of American journals, many of whom requested translation of listed papers. Republication of some papers is scheduled in a number of journals.

Reference works, such as the "Directory of Medical and Biological Research Institutes of the U.S.S.R.," "A Guide to Russian Medical Literature," and a "Russian-English Medical Dictionary," are products of the program, which is also planning the publication in English of selected Russian monographs.

The "Bulletin of Translations From Russian Medical Sciences" lists available translations and services and gives pertinent information about other translation programs, Government and private.

Address inquiries to the Russian Scientific Translation Program, National Institutes of Health, Public Health Service, Bethesda, Md.

Public Health Mission

to the

SOVIET UNION

AN "almost explosive extension" of disease prevention and medical care has taken place in the Soviet Union but the quality of service falls short of that found in the United States, according to the report of a mission of five American physicians who visited the Soviet Union late in 1957 under the U.S.-U.S.S.R. exchange program.

With the objective of studying public health problems and practices, the group traveled 8,500 miles and visited 61 institutions in 9 cities in 5 of the Soviet Republics during the period August 13-September 14, 1957. They found that medical care in the Soviet Union has been "tackled with vigor." There is a high ratio of physicians, and many hospitals have been built to serve the cities and rural areas. The group also found, however, that the Soviet Government has deliberately focused on quantity and widespread coverage of personnel and services at the expense of quality.

The report states that Soviet medical establishments are "antiquated or jerry-built" in contrast with those in the United States. It points out, however, that there are "certain ingredients in their political system and in their ability to accomplish mass transfer of brain and brawn from one field of endeavor to another which could permit astonishingly rapid changeover and developments in medicine as impressive as the appearance of Sputnik."

Pestilential diseases and the diseases of filth have been substantially brought under control. Malaria as a significant health problem is on the way to eradication. Venereal disease has

been mastered, but tuberculosis remains a plague.

Types of institutions visited included administrative public health headquarters, industrial health services, medical teaching institutes, "medium-medical schools," medical research institutes, local public health facilities, sanitary-epidemiological stations, urban and rural health centers, child nurseries ("creches"), rest homes, city markets, industrial plants, collective farms, and a number of other special medical facilities and institutions.

Other findings of the mission include:

- The health program of the Soviet Union is, like all programs, subject to the needs of the state and is therefore circumscribed by a series of allocations and goals. The health program is an instrument of state policy because the Soviet Union recognizes the importance of having a healthy working class if it is to achieve its major goals.

- Women represent the majority of practicing physicians in the Soviet Union.

- Medicine is considered an important but not a primary contributor to the Soviet economy. The average Soviet physician does not enjoy the same status as a Soviet engineer.

- The number of physicians trained annually exceeds the number trained in the United States, but the quality of basic training is at a much lower level.

- Clerical help and office equipment of the kind found in United States medical facilities are regarded as "unheard-of luxuries."

- The Soviet Union's system of medical care does not provide for free choice of physician by the patient, nor does it usually allow the physician to select his place of practice.

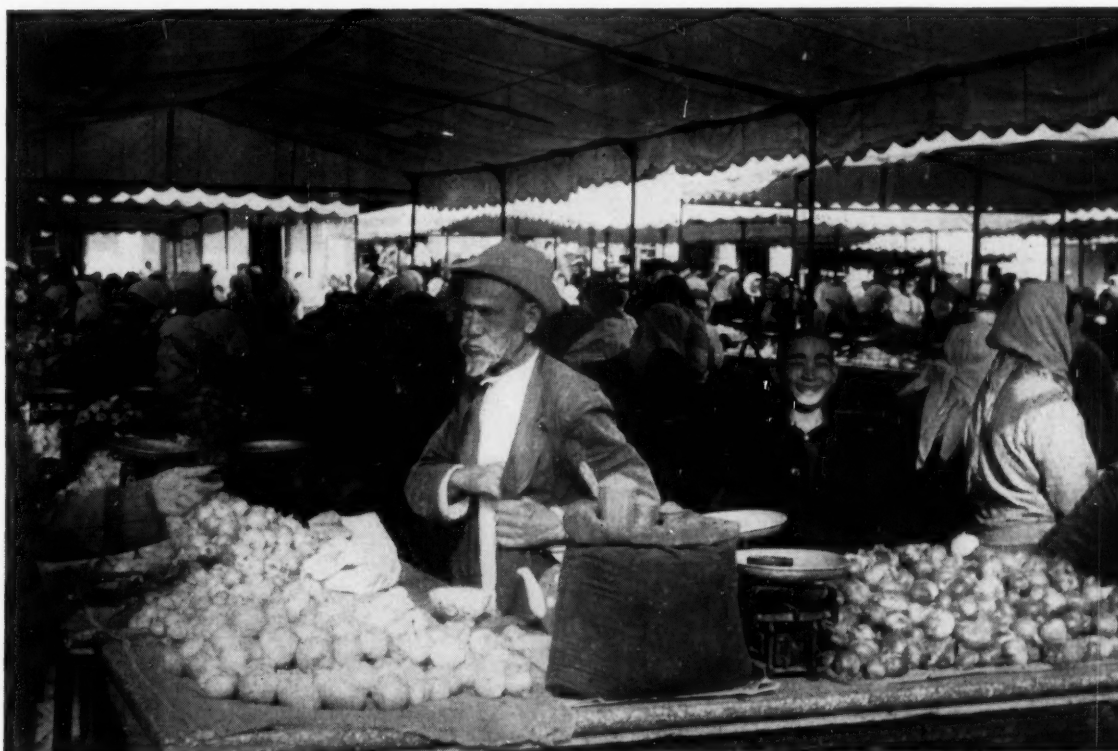
- Soviet medicine is, to a large extent, dependent upon clinical diagnosis with a minimum of laboratory support. The Soviet pharmacopeia in practice is much more limited in quantity and quality than that in the United States as to range of available antibiotics and chemotherapeutic agents.

- The Soviet Union is giving high priority to the extension of medical care and the improvement of health. Health and medical services are provided without cost to all citizens of the Soviet Union.

- Special attention is given to mothers prior to delivery of their children and during the postpartum period. Facilities are widely provided for daytime care of preschool children so that mothers can be released for work. Health departments are taking an active part in city planning from the standpoint of sanitation and health facilities.

The five-man mission consisted of Dr. Thomas Parran, chairman, former Surgeon General of the Public Health Service (1936-1948), now president and trustee of the Avalon Foundation, New York City; Dr. Otis L. Anderson, Assistant Surgeon General for Personnel and Training, Public Health Service; Dr. Henry van Zile Hyde, Assistant to the Surgeon General for International Health, Public Health Service; Dr. Malcolm Merrill, California State director of public health; and Dr. Leonid S. Snegireff, associate professor of cancer control, Harvard School of Public Health.

The mission's findings are contained in "The Report of the U.S. Public Health Mission to the Union of the Soviet Socialist Republics" (Public Health Service Publication No. 649). It may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., at 45 cents a copy. Single sample copies may be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D.C.



A typical market scene and food displays in the Asian Republics, where farm produce is sold for private profit in the open market.



Cambodian School

The teaching staff of the new school of nursing and midwifery in Phnom Penh is entirely Cambodian. Two nursing education advisers of the World Health Organization were asked, as a courtesy, to teach certain classes, but the school is almost wholly a Cambodian undertaking. Three of the faculty members are former trainees sponsored by the U.S. Operations Mission. Another trainee, who is studying nursing education in Montreal, Canada, will head the midwifery section of the school when she returns.

—CARLETON B. WHITE, M.D., *chief, Public Health Division, U.S. Operations Mission, Cambodia.*

House of Earth

A self-help plan is assisting city dwellers in Brazil to build and own their own homes at a cost of \$135 for materials. Serviço Especial de Saúde Pública has adapted to municipalities the aid system traditional in farming areas. A prefeitura, or municipal government, after creating the self-help service by municipal law, signs an agreement with SESP for administrative operation of the project by SESP engineering, public health education, and other staff members.

The houses, built according to minimum standards under this pilot project, have two rooms and a veranda which serves as kitchen and living room. Walls are of soil-cement blocks made by machine and compacted by the people themselves. The city grants the land, and materials are bought from a rotating fund made up of annual contributions from SESP and the municipality. The owner has 4 years to repay the loan; afterwards he owns the house he helped to build.

The Serviço has published "Casa de Terra," by Alvaro Milanez, technical consultant to SESP, which indicates some of the techniques, such as

rammed earth, adobe, wattle and daub, sod, and soil-cement, used in earth construction. The booklet is not a construction manual but is designed as a guide for public health workers and technicians in assisting those who want to build or improve dwellings. "Casa de Terra" can be obtained through the Health and Sanitation Division, U.S. Operations Mission, Brazil, for 50 cents a copy.

—E. ROSS JENNY, M.D., *chief, Health and Sanitation Division, U.S. Operations Mission, Brazil.*

Male Prerogative

Only the men became ill after a community birthday party in Songsa Ri, Korea, where the 400 villagers all have the same name and are all related to each other in some way.

At the invitation of the director of the Wondong health center, I went to investigate the outbreak; 38 men were still extremely sick 1 or 2 days after the celebration. I discovered the fried pork served at the party came from two pigs. One had died of natural causes, and the other had been ill prior to slaughter. *Salmonella* organisms were later isolated.

None of the women or children were ill because the men of Songsa Ri, following the custom of rural Korea, had dined first and eaten all the pork.

—WALDO SMITH, *sanitarian, U.S. Operations Mission, Korea.*

Precursor

Of much more value than Freud for his people is a dream book written by a Moslem healer, Ibn Sireen, said the first psychiatrist in the Sudan, Dr. Tigani el Mahi. However, the psychiatrist found a similarity between Freud and Sireen, who lived more than a thousand years ago. "Our book says that dreams are prophetic. Freud says dreams express wish fulfillment. What is prophecy but the foretelling of wishes coming true?" said Dr. Mahi, who spoke at the 1959 meeting of the American Orthopsychiatric Association in San Francisco.

When he returned to the Sudan after training in London, Dr. Mahi said he was surprised by the valid psychological insights of religious healers and medicine men in his country. He said he often referred patients to them, and they, in turn, were beginning to refer patients to him.

Infectious Encephalitis In Colorado

LUTHER E. GIDDINGS, M.D.,
STEPHEN G. COPPS, M.D.,
CLARENCE A. SOOTER, Ph.D.

BETWEEN May 1, 1956, and December 31, 1957, 258 cases of infectious encephalitis in Colorado were reported to us by physicians, hospital personnel, local health departments, and the Colorado State Department of Public Health. For most of these cases, it was necessary for us to rely on the clinical judgment of those making the diagnosis; since the acute phase of the illness had generally passed by the time the case was reported, laboratory diagnosis was not possible. Infectious encephalitis is generally defined as an acute disease process in which the patient exhibits typical signs and symptoms of central nervous system involvement (headache, fever, stiff neck and back, drowsiness, and spinal fluid pleocytosis) with a micro-organism as the presumed etiological agent.

This paper presents certain epidemiological aspects of this syndrome observed in the above-mentioned cases and compares some of these aspects as they differed according to the etiological agent involved.

Methods

Attempts were made to gather basic epidemiological information on all cases as they were reported. This information included, among other things, geographic, time, age, and sex data for each case. At the end of the 20-month period these isolated bits of information were compiled to demonstrate the geographic, time, age, and sex distributions of the cases.

Serum specimens were collected from patients when possible. In general, these specimens were paired, with one specimen taken early in the course of the disease (acute phase) and the second taken 3 to 6 weeks later, during

convalescence. Occasionally, only convalescent-phase specimens could be collected.

All specimens were tested with the hemagglutination-inhibition (HAI) test for antibodies against St. Louis encephalitis (SLE) and western encephalitis (WE). Most of the specimens were also tested with the serum neutralization (SN) test for antibodies against the same diseases. If sufficient sample remained it was tested with the complement fixation (CF) test for antibodies against mumps, lymphocytic choriomeningitis (LCM), and eastern encephalitis (EE) in addition to SLE and WE. (All CF tests were performed by the Communicable Disease Center, Virus and Rickettsia Laboratory, Chamblee, Ga.) The three poliomyelitis types were added to the CF battery in 1957. Also in 1957, convalescent-phase specimens from 27 patients which showed insignificant antibody titers in all the above tests were subjected to the SN test for ECHO viruses, types 2, 4, 6, and 9, and serums from 18 patients were subjected to the SN test for Colorado tick fever. (Tests for ECHO viruses were performed by the department of pediatrics, University of Colorado Medical Center, Denver, Colo. For Colorado tick fever, tests were performed by the Rocky Mountain Laboratory, Hamilton, Mont.)

A case was considered serologically "confirmed" if a fourfold rise in HAI or CF titer or tenfold rise in neutralization index could be demonstrated in paired specimens. A case was considered serologically "suggestive" when a CF titer of 1:8 or HAI titer of 1:80 was present but a rise in titer could not be demonstrated. The cases were then categorized ac-

Dr. Giddings, at the time of this study, was epidemic intelligence service officer with the Encephalitis Investigations Unit, Greeley Field Station, Communicable Disease Center, Public Health Service, Greeley, Colo. He is now a resident in pediatrics at Salt Lake County General Hospital, Salt Lake City, Utah. Dr. Copps, formerly on the staff of the Children's Hospital, Denver, Colo., is now with the Medical Corps, U.S. Army, Fort Riley, Kans. Dr. Sooter, formerly chief of the Greeley Field Station, is currently executive secretary, Research Fellowships Branch, Division of Research Grants, National Institutes of Health, Public Health Service.

Table 1. Etiology of 258 cases reported as infectious encephalitis in Colorado between May 1, 1956, and December 31, 1957

Classification	Method of diagnosis	Number of cases
St. Louis encephalitis	Serologic	21
Probable St. Louis encephalitis	do	27
Western encephalitis	do	20
Probable western encephalitis	do	5
Mumps	do	1
Mumps	Clinical	23
Measles	do	1
Influenza	do	4
Influenza	Serologic	1
Influenza	Virus isolation	1
Postvaccinal encephalitis	Clinical	1
Poliomyelitis type 1	Serologic	2
Poliomyelitis type 2	do	1
Colorado tick fever	do	1
Etiology unknown		149

cording to etiology by month of onset and age and sex of the patient.

Results

Study revealed that the 258 cases were, for the most part, roughly distributed in proportion to population density throughout Colorado. There were two exceptions to this rule. One was Grand Junction in Mesa County, and the other, the plains area in eastern Colorado. An

unusually high attack rate was seen in both of these places as a result of localized outbreaks of SLE in the summer of 1956. Cases were reported in each of the 20 months under discussion. The majority of the cases, however, are grouped together into two separate time periods: the late summer and early fall months of 1956 and the same period in 1957.

Each age group was involved, with the youngest patient 6 days of age and the oldest 82 years. There was, however, a marked preponderance of cases among people under 20 years of age, particularly among those under 10.

The etiological agent was defined by laboratory or clinical means in 109 of the 258 cases (table 1). The arthropod-borne diseases, SLE and WE, accounted for 67.0 percent of the cases in which the etiology is known, while mumps accounted for 22.0 percent. Influenza was next in line, followed by poliomyelitis, measles, Colorado tick fever, and postvaccinal encephalitis.

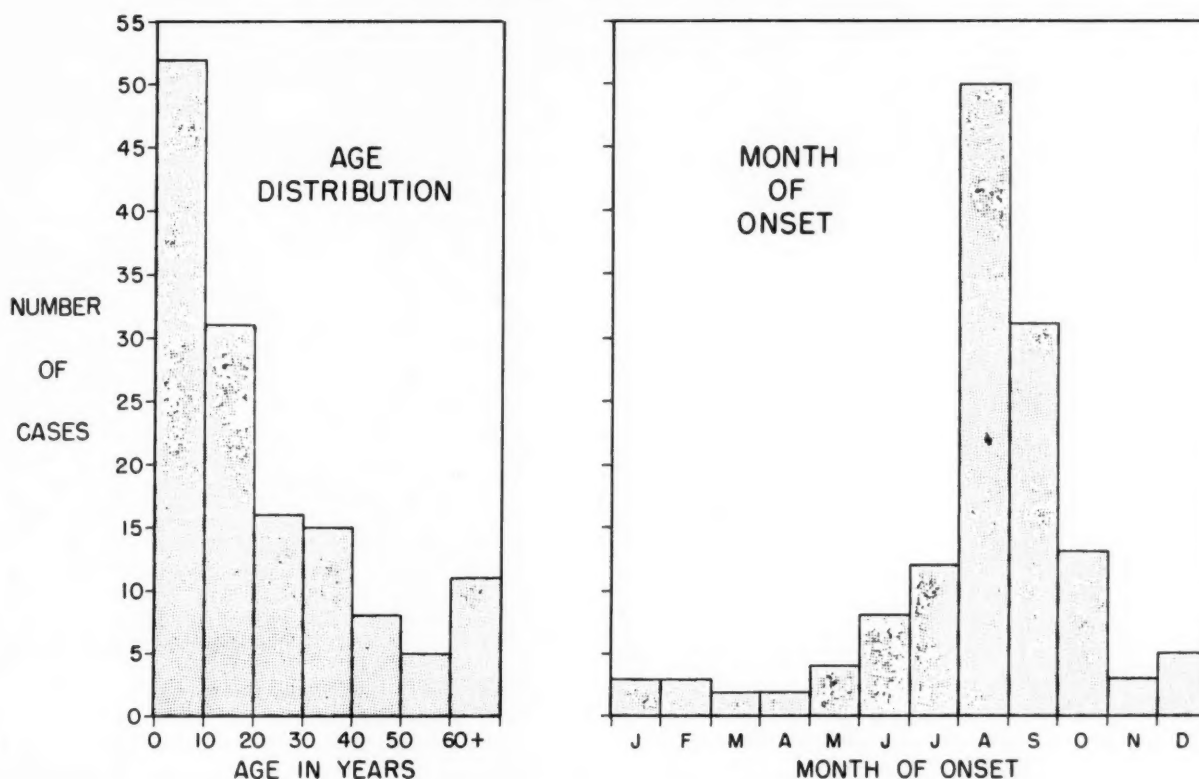
An effort was made to exclude cases of non-paralytic poliomyelitis from the study. The three cases that are included were originally reported as infectious encephalitis, and it was only on subsequent serologic examination that the true etiology of the disease became known. On the other hand, two cases which were originally reported as nonparalytic poliomyelitis were subsequently found, on serologic exami-

Table 2. Results of serologic tests for various etiological agents of infectious encephalitis

Disease	Ratio of cases ¹ to paired specimens tested			Percent positive of those tested
	1956	1957	Total	
St. Louis encephalitis	43/61	5/64	48/125	38. 4
Western encephalitis	3/61	22/64	25/125	20. 0
Mumps	0/45	1/46	1/91	1. 1
Lymphocytic choriomeningitis	0/45	0/46	0/91	0
Eastern encephalitis	0/45	0/46	0/91	0
Poliomyelitis type 1	0/0	2/46	2/46	4. 4
Poliomyelitis type 2	0/0	1/46	1/46	2. 2
Poliomyelitis type 3	0/0	0/46	0/46	0
Asian influenza	0/0	1/2	1/2	50. 0
Colorado tick fever	0/0	1/18	1/18	5. 6
Results conclusive	46/61	33/64	79/125	63. 2
Results inconclusive	15/61	31/64	46/125	36. 8
Total	61/61	64/64	125/125	

¹ Includes "confirmed" and "suggestive" cases.

Figure 1. Cases of unknown etiology reported as infectious encephalitis, Colorado, July 1, 1956–December 31, 1957.



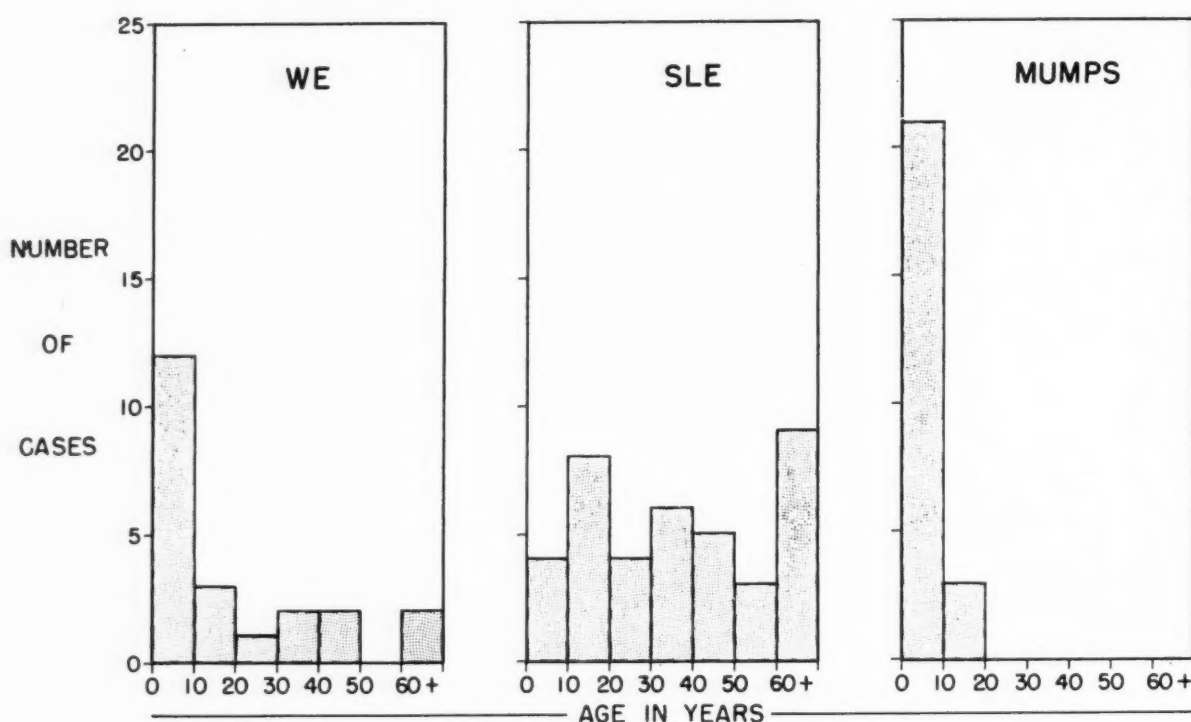
nation, to be WE. The largest group, unfortunately, is that in which the etiological agent is unknown. This group is composed of 149 cases, or 57.8 percent of the total number.

Results of the serologic tests can be seen in table 2. The largest number of specimens (125) were tested for antibodies against SLE and WE. These two diseases, in order, were responsible for the largest numbers of serologically confirmed and suggestive cases. Fifty percent of those tested for Asian influenza were confirmed to give the highest ratio of cases to paired specimens tested in this series. However, this involved serum specimens from only two individuals. SLE was next highest with 38.4 percent, followed by WE with 20.0 percent. Smaller percentages were noted for the other diseases mentioned previously. Low-level antibody titers against various types of ECHO virus were found to be present in 8 of the 27 (29.6 percent) convalescent-phase specimens tested. None of the specimens had antibodies against type 4, two had antibodies against type 2, six had antibodies against type 6, and five

had antibodies against type 9. Two specimens had antibodies against types 6 and 9, one against types 2 and 9, and one against types 2, 6, and 9. No attempt will be made to interpret these results since it is not known whether any of the serums underwent a rise in titer. Attempts at interpretation would be made still more hazardous by the lack of knowledge concerning the presence of such antibodies among the general population in this area. One of the 18 (5.6 percent) tested for Colorado tick fever was considered "confirmed" on the basis of an 18-fold rise in neutralizing titer. Moderately high titers were demonstrable in the serum of three other patients, but, again, since there was no significant rise in titer, no attempt will be made at interpretation.

As noted previously, the largest group studied was that in which the etiology was unknown. Age distribution and distribution by month of onset for that group are given in figure 1. The seasonal distribution for the next three largest groups, SLE, WE, and mumps, may be seen in figure 2, and the age distribution

Figure 2. Seasonal distribution of western encephalitis, St. Louis encephalitis, and mumps encephalitis, Colorado, May 1, 1956–December 31, 1957.



in figure 3. The age distribution was somewhat alike for WE, mumps, and cases of unknown etiology in that the disease was primarily in individuals under 20 years of age. SLE showed fairly even case distribution among all age groups with only a slightly larger number of cases among older people. The seasonal distribution of cases of unknown etiology (fig. 1) looks somewhat like a composite of the distribution of SLE, WE, and mumps (fig. 2), with cases occurring in each month of the year. An increase in the number of cases starts in May, continues through June and July, and reaches a peak in August. From there it declines gradually through the month of October. WE and SLE are restricted to the late summer and early fall months, while mumps is seen in all seasons, but primarily in the spring. The sex distributions, shown below, for WE, SLE, and mumps are similar, with more males than females in each group.

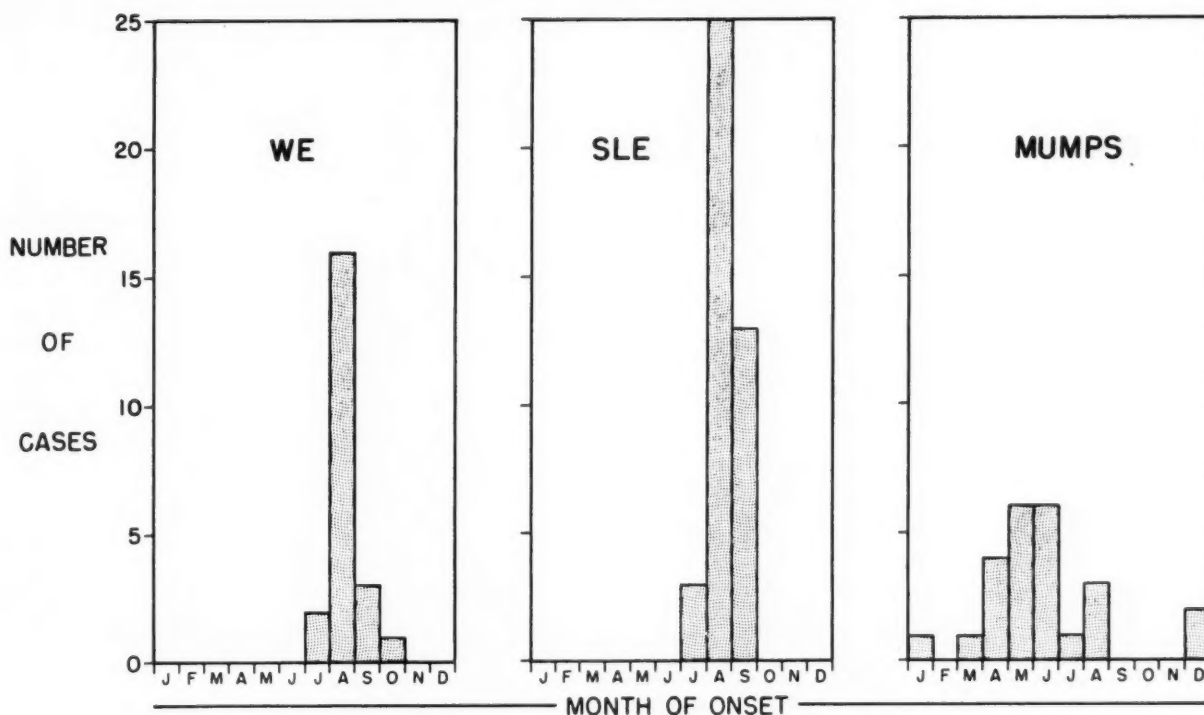
	Number of cases		
	WE	SLE	Mumps
Male.....	16	23	18
Female.....	7	19	6

There were 10 deaths among the 258 patients. One of the fatal cases, with signs and symptoms typical of encephalitis, was felt to be due to Asian strain type A influenza since the virus was cultured from a piece of lung tissue taken at autopsy. Two of the deaths were thought to be possibly due to SLE because of moderately high antibody titers in specimens taken during the acute phase. In each case the patient died before a second specimen could be obtained. Virus isolation attempts were made on a section of brain from one of the two patients, but no viruses were obtained.

Discussion

The fact that the cases of infectious encephalitis observed were distributed roughly in proportion to the human population would lead one to believe that the causative agents are widely distributed within the State. All the agents are not known, but SLE, WE, and mumps would appear to be particular problems. However, since a special effort was made to search out cases of SLE and WE, it may be that

Figure 3. Age distribution of western encephalitis, St. Louis encephalitis, and mumps encephalitis, Colorado, May 1, 1956–December 31, 1957.



the importance of these two diseases is exaggerated. It is entirely possible that an even greater problem lies hidden among those cases of unknown etiology but we have no evidence of such. It is only possible to theorize concerning the possible agents involved in that group. It would seem likely that some of the cases on which laboratory procedures were not carried out were nonparalytic poliomyelitis and WE, or were due to encephalitogenic types of ECHO or Coxsackie viruses. This assumption can be borne out to a minor degree by comparing the age distribution and epidemic curves of these cases of unknown etiology (fig. 1) with those of outbreaks of the diseases mentioned above (1-3). The significance of the presence of antibodies against certain types of ECHO viruses among some of these patients is not known. SLE can also be compared as far as the epidemic curve (fig. 2) is concerned, but the age distributions do not compare well (fig. 3). A number of those cases which occurred in the winter, spring, and early summer might very well have represented mumps encephalitis without clinical parotitis. It has been noted in the

past that as many as 50 percent of the cases of mumps encephalitis fit into this category (4).

Unfortunately, many cases of encephalitis are never reported to authorities in Colorado. With more complete reporting and the submitting of specimens for testing from most of the encephalitis patients, it seems likely that mumps would become the largest etiological group, as it is in California (5). An additional problem is the confusion in attempting to differentiate between nonparalytic poliomyelitis and infectious encephalitis on a clinical basis. It is generally agreed among those who do a great deal of work with acute diseases of the central nervous system that the only reliable way to make such a differentiation is on the basis of laboratory findings.

Probably the most striking feature, though one that would not be unexpected, is that all cases of mumps encephalitis were seen in patients under the age of 20. While WE shows a tendency to infect people of most ages, it is obvious that this disease, like mumps, attacks more people in the younger age groups than in the middle and older age groups.

SLE tends to infect people of all ages, with a slight preference for the older age groups. The difference between mumps and SLE can be explained by the fact that mumps is a highly infectious disease, endemic in most areas of this country, which becomes epidemic whenever a sufficient number of people who are not immune are present. This means that as children are born following a mumps epidemic the stage is being set for a new epidemic several years later. As a result of these frequent epidemics most people become immune before reaching an advanced age. SLE and WE, on the other hand, while they are both endemic in Colorado (6), can probably be spread only by the bite of an infective mosquito (7). The incidence of these two diseases in a community is therefore dependent on mosquito populations and mosquito infection rates and numerous other poorly understood factors. In light of our present knowledge, the age distribution differences between SLE and WE cannot be explained.

The preponderance of male patients infected with the SLE and WE viruses could possibly be explained by the fact that men and boys in general spend more time out-of-doors and are, hence, at greater risk of exposure to infective mosquitoes. This does not, of course, hold true with infectious parotitis since both sexes are generally affected equally (8).

Summary

A total of 258 cases of encephalitis were brought to the attention of the authors between May 1, 1956, and December 31, 1957. There were 10 deaths in this group. Geographic, time, age, and sex distributions of the cases were noted.

The viruses of SLE, WE, and mumps were the most common causative agents. Epidemiological characteristics of these three types of encephalitis were compared.

More diagnostic work needs to be done in the field of infectious encephalitis in order better to evaluate the problem brought about by the large number of agents which can produce this syndrome.

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HORIZONS in Rural Health

THE 14th National Conference on Rural Health was held in Wichita, Kans., March 5-7, 1959, under the sponsorship of the Council on Rural Health, American Medical Association. Representatives of farm organizations, the council, and State medical societies, and workers in the agricultural extension service and in official and voluntary health agencies attend these conferences, held in a different part of the country each year.

The Council on Rural Health is the official body representing the rural health interests of 160,000 physicians who constitute the American Medical Association. The group was appointed in 1945 by the association's board of directors in response to an invitation from the American Farm Bureau Federation to join with it in a study of the rural health situation. Dr. Franklin S. Crockett, Lafayette, Ind., has been chairman since 1945. Advisers have been added to the original group to increase representation of agricultural producers and educators.

Every national conference has stressed the theme of self-help and the roles of the individual general practitioner and the individual citizen in meeting personal and community health needs.

During recent decades, many changes have taken place in rural America. The city-limit sign no longer sets families living in towns apart from those living in the open country, with each having different sets of living standards and widely differing opportunities for health services.

Many factors have contributed to a revolution in farm family living: electricity on the farm and in the farm home, improved roads, greater ease of travel, and higher family income. New hospital construction, particularly since the 1946 enactment of the national hospital and medical facilities construction program, has helped to arrest the decline of health services in rural areas. Voluntary health insurance as a means of budgeting family medical and hospital expenses has been widely

adopted by rural as well as urban families. Rural families can now command to a far greater extent than in the past the services once available chiefly to families in cities.

Still problems persist, and the need continues for a partnership among practicing physicians, rural people, and other groups which can contribute to their solution. Among other problems, this year's National Conference on Rural Health emphasized aging, mental health, and dental health.

Aging

Problems of the aging represent a growing challenge to rural communities, many of which have a disproportionate share of their population in the older age brackets. As a first step toward meeting the needs of the aging, Aubrey Gates, field director of the Rural Health Council, suggested making an inventory of a community's assets in the form of its elder citizens. How many are there? What knowledge and skills do they have of value to their community? How can these continue to be used?

He called for community action to employ the skills of the aged productively, to consider and provide for the needs of older people for housing and recreation opportunities, to plan for the building and maintenance of safer, more modern facilities for care of those who cannot remain at home, and to plan for better home care and visiting nurse service for those whose disabilities require outside assistance although care away from their own homes is not necessary.

Local churches and other organized community groups can help to stimulate and conduct programs to keep the aged an integral part of community life, and to stimulate and advise other groups having responsibility for meeting the health needs of the aged. Rural families can participate in such activities and lead in their development.

Other conference speakers emphasized what people can do for themselves throughout their lives that will help to prevent or alleviate problems of age. Planning in youth and in the middle years can avoid some of the economic as well as the physical and emotional hazards that beset later years. Preparation for senior

citizenship should include attention to proper diet and exercise, cultivation of interests outside the job, and regular physical checkups to detect and treat disease while recuperative powers are still high.

Mental Health

The need for a change in public expectations regarding mental hospitals was discussed by Dr. Prescott Thompson of the Menninger Clinic at Topeka, Kans. In the past, these hospitals were, in fact, asylums in which the mentally ill were doomed to spend their lives, separated from society and with no hope for rehabilitation to restore their capacity for normal living. Now an increasing number of former mental patients are returning to normal lives in their own families and communities. In many cases, local attitudes make such a return difficult, since these attitudes are still based on the old concept of a mental hospital as an asylum where those who enter have no chance to recover from illness.

Some communities have recognized the serious national shortage of trained people for community mental health programs. They have sponsored institutes for ministers, school guidance personnel, and others in a position to provide mental health counseling to local people.

Dental Health

Mrs. E. Arthur Underwood, a practicing dentist of Vancouver, Wash., suggested taking a child to the dentist early as a way to help the child feel that the dentist is his friend, not a person to fear. Parents' attitudes also influence a child's attitude toward the dentist. Frequent visits to the dentist are needed even at an early age to have cavities filled, to prevent further spread of dental disease, and to remove accumulated tartar.

Protection against decay is possible at home through substituting fruit, carrots, and celery, and other low carbohydrate foods for cookies and candy for afterschool snacks. Adequate brushing of teeth will help to remove the food residue that is necessary for bacteria to flourish.

Going beyond action by the individual and family, fluoride in drinking water was pointed

out as "an unparalleled achievement in disease prevention." Where fluoridated water is not available, topical application of fluorides to the teeth greatly reduces dental caries.

Accidents

Accidents result in approximately 12,000 deaths and another 1 million injuries among rural people in the United States annually. Because of this record, the National Grange asked its 7,000 local groups to keep account of accidents in their communities during the past year. In addition, nearly 1,000 local granges sponsored local safety programs.

Occupational health programs for people employed in agriculture are in their infancy. Farm mechanization has increased at a rapid rate without the same attention to safeguards against accidents that has been given in industry. Brucellosis and other animal diseases communicable to man are another hazard of farming, and the continued cooperation of the medical profession, public health agencies, and local citizens is required to control them.

Future Needs

Dr. Franklin Murphy, chancellor of the University of Kansas, outlined major needs for the future:

- More planned organization of area medical service, carried out by governmental agencies, citizens, and other groups working jointly, with patients and services flowing freely in both directions from the center to the periphery.

- Continued remodeling of professional education, both for the medical student and the practicing physician, to produce the best kind of family physician.

- Medical practice by teams of physicians rather than solo practitioners in rural areas.

Roy Battles, speaking for the National Grange as well as for other rural people, concluded that now that we have had our health horizons lifted, our personal dimensions of disease prevention and cure broadened, our knowledge of many maladies expanded, we want all the first-class medical services that we have read about.

In delineating the areas of need, he said: "Too many people do not know about or concern themselves with preventive care. Too many rural people are too fat. Too many are involved in accidents. Too many have to wait too long in the doctor's office. Too many communities have their doctors spread too thinly. . . . The same general trend is evident in varying degrees in the case of hospitals, clinics, public health services, nursing homes. . . . Rural people have a long way to go just to catch up to our urban neighbors."

CDC Courses in Insect and Rodent Control

Refresher training in insect and rodent control will be offered at the Communicable Disease Center, Atlanta, Ga., from September 1959 through June 1960, according to the following schedule:

Insect control. September 14-25.

Rodent control. September 28-October 9.

Mosquito control. November 2-6.

Identification and biology of arthropods of public health importance. January 11-22.

Epidemiology and control of vector-borne diseases. February 15-19.

Insect and rodent control. June 6-17.

There are no tuition or laboratory fees for

the courses. Students will be accepted from State and local health departments, the Armed Forces, and other organizations concerned with insect or rodent control. Qualified students from other countries will be accepted and given opportunity to study vectors of important diseases. Applications for any of these courses should be submitted at least a month before the course begins.

Application forms may be obtained from the Chief, Training Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga.

STATEMENT

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, April 20, 1959*

Care of Mental Patients

TENS of thousands of mentally ill patients in our Nation today are receiving disgracefully inadequate care and treatment.

While there has been some encouraging progress against mental illness in recent years, the situation as a whole is one that I believe the American people would find genuinely shocking if they knew the facts.

I recognize that this is an immensely difficult problem, aggravated by too little scientific knowledge and to a considerable extent, even today, by old fears and superstitions.

One thing, however, is clear: The resources we are devoting to mental illness today fall dreadfully short of meeting the problem. We have not yet mounted an effective attack on mental illness in this country. The fact is, we are barely holding the line.

One does not need to dig very deep into this problem to uncover some shocking deficiencies. I am satisfied that, on the whole, we are beginning to make real progress in the area of research. But in the area of hospital care and treatment, we are far behind.

Many of the 277 State and county mental hospitals in this country are still little more than custodial institutions with wholly inadequate funds, personnel, and facilities for even the simplest methods of treatment.

For the Nation's public mental institutions—where about 9 out of 10 of those in mental hospitals are today—the average expenditure for both care and treatment is only \$4.07 per patient per day. When we compare this with the average cost of \$26 per patient per day in general hospitals, exclusive of physicians' fees, we get some idea of what the great majority of

patients in public mental institutions are up against.

The average expenditure of \$4.07 per patient per day in public mental institutions becomes even grimmer when we take into account the fact that most mental hospitals today devote their best facilities and personnel to the treatment of newly admitted patients whose chances of recovery are greatest.

Today, a patient entering a mental hospital has a 50-50 chance of getting out during the first year. After the first year, however, with the resources currently available, the chances of recovery decline sharply. If a patient does not respond to intensive treatment during the first few months, he must be shifted to the chronic wards in order to make room for new admissions.

Patients who do not get well the first year now have only 1 chance in 5 of ever leaving the hospital and after 5 years only 1 chance in 100.

I am advised, however, that the condition of the longer term patients is by no means as hopeless as the statistics would suggest, that a great many of them could be restored to normal, productive lives if adequate treatment were available. Surely a far greater effort than is possible with the resources available today is needed to rehabilitate the longer term patients—the forgotten men and women of the back wards of our mental institutions.

That this would be a fruitful expenditure of time and effort was proved rather dramatically by a study at a Maryland State hospital. In this project, 72 men patients, all of whom had been in the hospital for more than 5 years and some for more than 10 years, were taken from

different wards and placed in a convalescent cottage where the professional staff could give them close attention.

The doctors concluded that 55 of these 72 patients were well enough, after intensive treatment, to leave the hospital if they had the incentive to do so and a suitable home to go to. For some it was too late—they had lived at the hospital so long that it was home to them and they did not want to leave. But 26 of the 72 did leave, and all but one of these got jobs and became self-supporting.

To keep such persons in mental hospitals all their lives is not only to fail in a duty of common humanity but it is false economy. Let us say that it would have cost \$1,500 a year, the national average, to maintain these 25 patients in the hospital for the rest of their lives and that they had an average life expectancy of 20 years. This would amount to a total cost of \$750,000—three quarters of a million dollars to maintain in a mental institution for the remainder of their lives 25 men who proved to be perfectly capable of becoming productive members of society.

Similar evidence that large numbers of patients in mental hospitals today need not be there was produced in a study supported by the National Institute of Mental Health at a hospital in California. In this study, 235 long-term patients were given intensive treatment and their record of improvement compared to that of a matched control group. The recovery rate among the special treatment patients was $2\frac{1}{2}$ times that of patients in the control group.

It must be recognized, of course, that it is not easy for a former mental patient to make the transition from hospital to community life. One of the greatest difficulties in making the transition has to do with earning a living. Here there are positive barriers, far more formidable ones than those which many employers put up against hiring the physically handicapped.

A great deal more needs to be done to pave the way for employment of former mental patients, an area that does not require large outlays of money but the priceless ingredients of public compassion and understanding.

The Department of Health, Education, and Welfare, I am happy to report, has been qui-

etly working on this aspect of the problem as an employer. Several persons who have been patients at St. Elizabeths Hospital are employed right now in various agencies of the Department and are doing very well.

These patients were started in carefully selected jobs, working at the Department during the day and returning to St. Elizabeths at night. Nearly all of these patients have gone on from these especially selected positions to regular employment either in the Department or in private industry.

Statistically, of course, this program is not significant. Altogether only about two dozen patients have been involved so far. But the success of this program, it seems to me, should have great significance for all employers.

I think everyone would agree that much could be accomplished if industry, large and small business, public and voluntary agencies, and others concerned applied effort and time toward breaking down the barriers to employment of former mental patients.

There are also large numbers of patients in mental hospitals today who, although not employable, could be cared for much more satisfactorily outside the hospital.

The traditional idea of caring for all mentally ill people in one big institution, regardless of the type or severity of their illness, is being seriously questioned by competent authorities as an effective means of dealing with this vast and complex problem. There are, for example, thousands of elderly people in mental hospitals who could be cared for much better in nursing homes or other facilities more suited to their needs.

A concerted movement in this one direction alone would greatly reduce overcrowding of mental hospitals and the heavy burdens now imposed on limited hospital staffs.

The National Institute of Mental Health provides advisory services and matches State funds to help communities build facilities and provide services for such people. The Institute also offers mental health project grants specifically designed to support projects for the development of new and improved methods of care and treatment for mental patients.

A fully effective attack on mental illness requires not only greater effort to get people out

of mental hospitals but also much greater effort to keep mental and emotional disorders from developing to the point where a mental hospital is the only answer. For this we need many more clinics and other outpatient facilities for the less seriously disturbed and more day-care centers and psychiatric units in general hospitals for those whose conditions require more extensive treatment.

The consensus of those with whom I have discussed this problem appears to be that one of the greatest potentials in the whole field of mental illness lies in earlier diagnosis and earlier intensive treatment.

In this connection, the National Institute of Mental Health is supporting a study to determine the feasibility of incorporating protection against mental illness in voluntary health insurance programs. Such a development, I am convinced, would go a long way toward encouraging people with incipient mental or emotional disorders to obtain competent professional advice and assistance before their ailments reached a serious stage. There have been several instances, I understand, where a few ounces of prevention in the form of intensive early treatment have worked wonders with persons who in the normal course of things probably would have landed in mental institutions.

The great need today is for more professionally trained personnel in all fields of mental health.

The American Psychiatric Association in December 1957 published results of a study of professional staff in public mental hospitals as of 1956. This study shows that the number of physicians, psychologists, registered nurses and other nurses, and attendants was grossly inadequate.

The minimum APA recommendations for physicians in mental hospitals is 1 to every 94 to 98 patients. The actual ratio in 1956 was 1 physician to every 184 patients, or a shortage of 55 percent.

The recommended ratio of clinical psychologists is 1 to every 400 to 500 patients. The actual ratio of 1 psychologist to every 769 represents a shortage of over 35 percent.

The recommended ratio of registered nurses is 1 to every 15 patients. The actual ratio of 1 registered nurse to every 77 patients in 1956 represented a shortage of over 80 percent.

The APA recommends that in addition there be one other staff member (nurse or attendant) to every five patients. The actual ratio of one to every seven patients in 1956 represented a shortage of about 25 percent.

Because of these shortages, I am told that the potentials inherent in the new tranquilizing drugs are as yet largely unrealized. These drugs do not cure mental illness. They are effective in calming disturbed patients to the point where they can be reached with treatment. If the treatment is not available, the effect of the drugs is lost.

WHO Publications

Medical Education. Annotated bibliography, 1946-1955. 1958; 391 pages; \$6.75.

First Report of the Expert Committee on Water Fluoridation. WHO Technical Report Series No. 146; 1958; 25 pages; 30 cents.

Post-Graduate Training in the Public Health Aspects of Nuclear Energy. Fourth report of the Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel. WHO Technical Report Series No. 154; 1958; 53 pages; 60 cents.

These publications may be obtained in the United States, directly or through a bookseller, from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y.

Federal Publications

Swimming Pools. Disease control through proper design and operation. *PHS Publication No. 665; 1959; by Jerrold M. Micheal; 147 pages; 75 cents.*

Design, construction, operation, and maintenance of swimming pools and the effect of each on disease control practices are discussed. Prepared as a training and reference guide for use by the Communicable Disease Center in its courses for public health personnel, this manual is intended also for use in State and local inservice training programs.

Swimming. *PHS Publication No. 98 (Health Information Series No. 7); revised 1959; leaflet; 5 cents, \$2 per 100.* Cautions swimmers against overexertion, and warns of unseen dangers. Emphasizes safe practices.

Municipal Water Facilities. Communities of 25,000 population and over, continental United States and territorial possessions, as of January 1, 1958. *PHS Publication No. 661; 1959; 83 pages.*

Changes which have occurred in the organized community water facilities of approximately 850 municipalities since 1956 are reflected in this inventory. Directed to industries, other private agencies, and all levels of government, the report should be useful in planning for broad water developments, industrial expansion, and national emergencies.

Health Statistics From the U.S. National Health Survey. Persons injured, by class of accident, United States, July 1957-June 1958. *PHS Publication No. 584-B8; 1959; 62 pages; 40 cents.*

This report adds information to that already published from the health survey on class of accident and on age, sex, and urban-rural residence of persons injured. The tables cross-classify characteristics of the population with medical attention and activity restriction result-

ing from injuries. They also relate the persons injured to income level and to major activities of working, keeping house, retirement, and school attendance.

Appendixes carry technical notes on methods, give definitions of terms, and show the content of the questionnaire used to collect the information.

National Water Quality Network. Annual compilation of data, October 1, 1957-November 30, 1958. *PHS Publication No. 663; 1958; 239 pages; \$1.50.*

Approximately a dozen chemical determinations and data on coliforms, plankton, organic materials extracted by activated carbon, and radioactivity are set forth in this first annual report following establishment of the water quality network.

The raw data, presented chronologically, were obtained from about 50 sampling stations set up by the Public Health Service and operated cooperatively with local and State agencies. Statistical and other analyses of the data will be published separately.

Psychopharmaca. A bibliography of psychopharmacology, 1952-57. *PHS Publication No. 581 (Public Health Bibliography Series No. 19); 1958; by Anne E. Caldwell; 258 pages; \$1.50.*

Approximately 2,500 articles dealing with psychopharmaca, defined as drugs that primarily affect the mental state, are indexed in a subject list of drugs and again in an author list. The articles are concerned with the effects on psychological, behavioral, and encephalographic reactions of normal subjects, patients, and laboratory animals. They were published between January 1952 and December 1956, with a partial listing for 1957.

To aid the user in locating entries in the subject list, a drug index lists chemical, code, trade, and generic names of drugs, names of drug

groups, trade names of drug combinations, and terms for special therapeutic and research techniques. An ancillary subject list of special conditions contains articles referring to the aged, alcoholism, children, and pain.

Viral Hepatitis. Clinical and public health aspects. *PHS Publication No. 435; revised 1959; by Heinz Eichenwald and James W. Mosley; 56 pages; 20 cents.*

Directed to public health workers and physicians, this manual contains comprehensive discussions of the diagnosis, prevention, and treatment of hepatitis, and of the role of the health department during an epidemic. Appendixes outline information applicable to the operation of mass inoculation clinics, procedures to be employed in an epidemic area, and forms useful in obtaining family and case histories.

Budget Payment Plan of the Nevada State Dental Society. *PHS Publication No. 651; 1959; 18 pages.*

A dental postpayment plan is analyzed to ascertain characteristics of the people who obtain loans to purchase dental care and the nature of the care they purchase.

Sex, age, occupation, family income, and number of persons covered by notes are included in the study of characteristics of the borrower. Frequency of occurrence and expenditures are shown for the various types of dental service provided.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

echoes



EXPERIMENTAL PELLAGRA IN THE HUMAN SUBJECT BROUGHT ABOUT BY A RESTRICTED DIET.

By JOSEPH GOLDBERGER, Surgeon, and G. A. WHEELER, Assistant Surgeon, United States Public Health Service.

In this communication we present a brief outline, with the results, of an experiment planned to test the possibility of producing pellagra in the healthy human, white, adult male, by a restricted, one-sided, mainly carbohydrate (cereal) diet.

The experiment was carried out at the farm of the Mississippi State Penitentiary, about 8 miles east of Jackson, Miss. At about the center of this farm of some 3,200 acres, well isolated from the surrounding communities, is the "camp," consisting of a group of frame buildings, including the cottages of the officials, the "cage," "new hospital," barns, stables, etc. Dr. A. G. McLaurin, the prison physician, informs us that there is no history of the occurrence or presence of pellagra on this farm.

During the period of the experiment there have been quartered at this "camp" an average of between 70 and 80 convicts, all white males. Included in this number were 12 who, accepting the offer of a pardon made them by Gov. Brewer and with the assurance of proper care and treatment should such be needed, volunteered to submit themselves to the experiment. White adult males were selected because, judged by the incidence in the population at large, these would seem to be least susceptible to the disease.

Experiment.

The volunteer squad of 12 men was organized between February 1 and February 4, 1915. On July 1, 1915, one of the volunteers was released because of the development of a prostatitis. This left 11 men in the squad, 24 to 50 years of age, who have remained in the test, on the prescribed diet, to its termination, October 31, 1915. These men were quartered in the so-called "new hospital building," a small, screened, one-storied cottage, about 500 feet from the "cage" in which the other convicts were domiciled. This cottage had previously been used as the quarters for the "assistant sergeant" of the "camp." From the time of its organization this squad was strictly segregated and under guard day and night.

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Dr. Goldberger and Dr. G. A. Wheeler produced pellagra in 6 of 11 men by restricting their diet mainly to carbohydrates. Later, with Sydenstricker (*Public Health Reports*, March 19, 1929, pp. 648-713), they showed a relationship between pellagra and diet lacking in milk and fresh meat.